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Vol. 21 July 1954 No. 7

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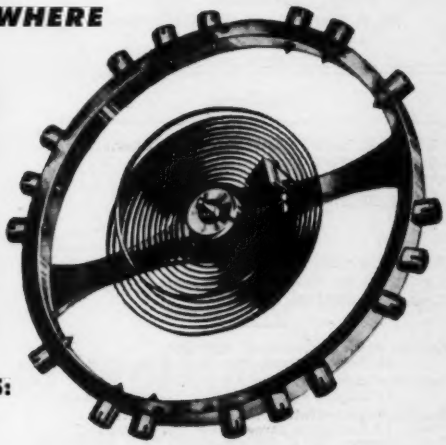

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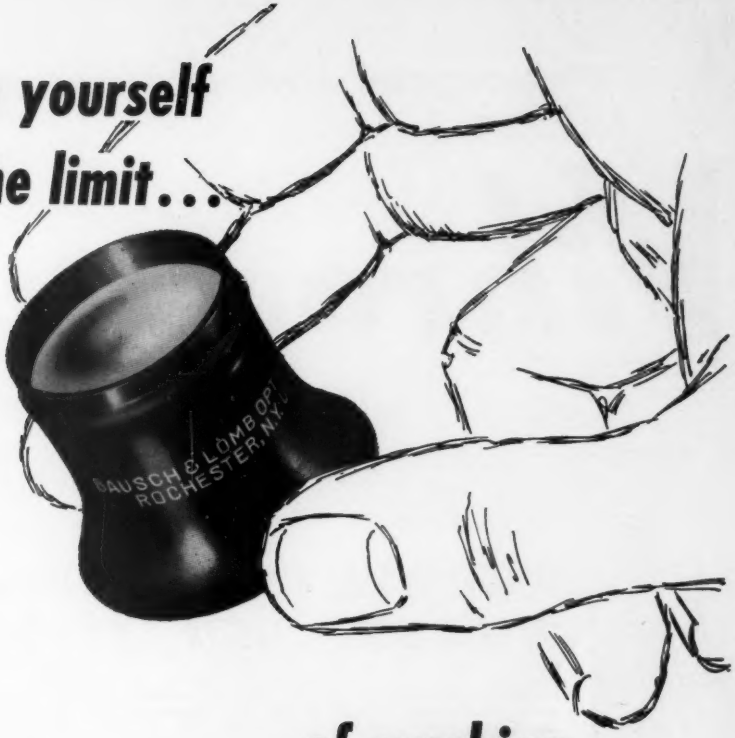

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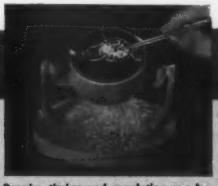

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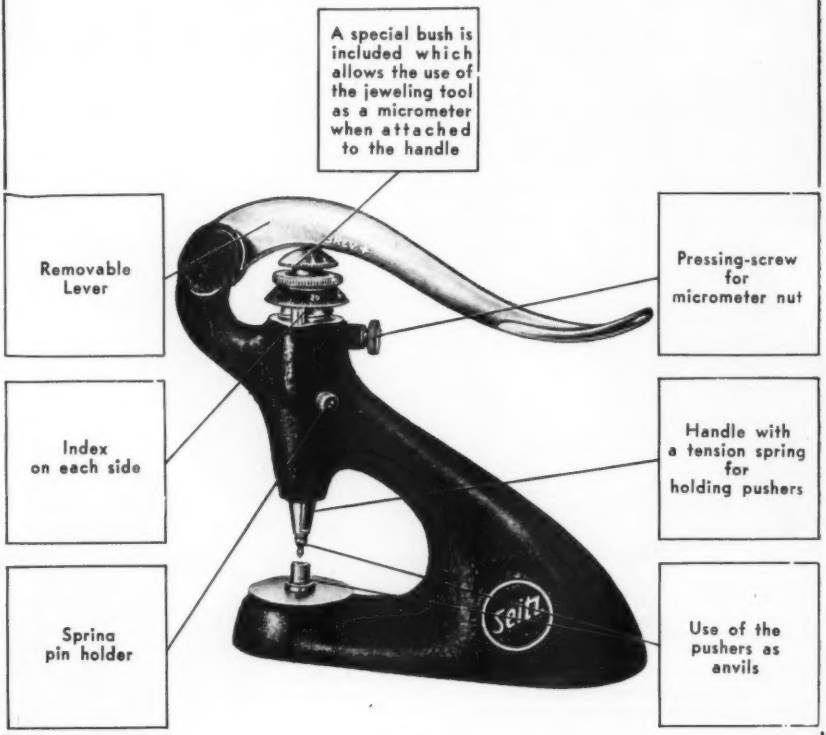
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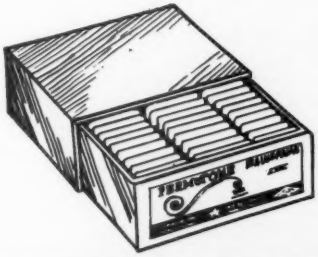

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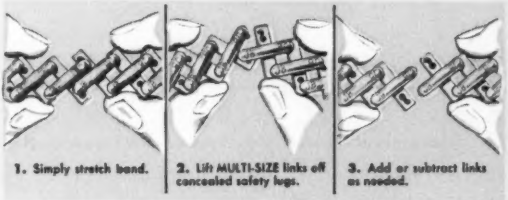

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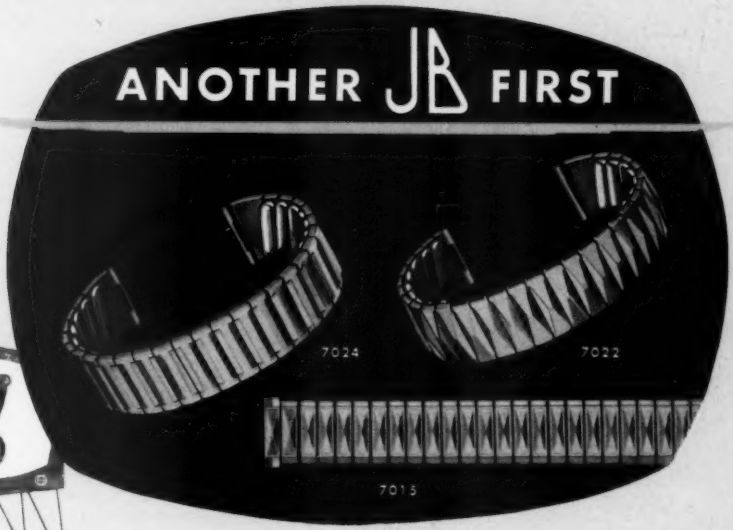

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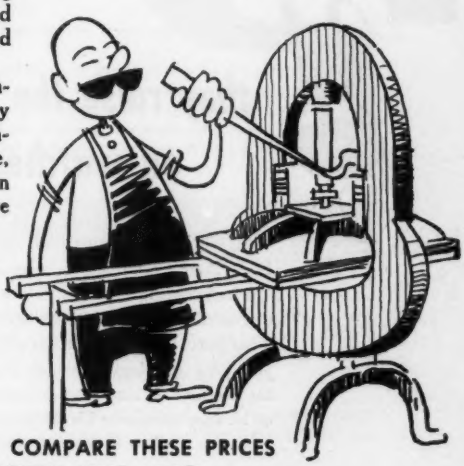

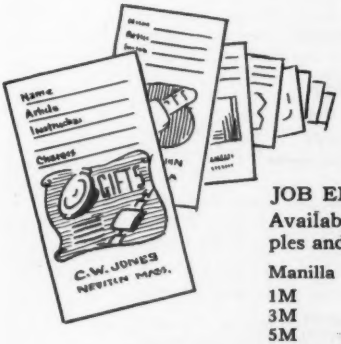

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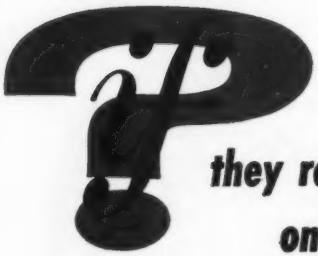

...they raise the tariff on watches...

"It is officially confirmed that the U. S. Tariff Commission's recommendation (to increase the tariff on watches) was delivered to President Eisenhower May 28th. Therefore, the President has until July 28th (60 days) in which to announce his decision. It may take the entire 60 days or he may announce his decision any time."

—from the June, 1954, issue National Jeweler

This information is reprinted from a brochure *"If they raise the tariff on watches,"* sent to U. S. jewelers, watchmakers and suppliers, as a service by The Watchmakers of Switzerland. For additional copies, please write, c/o Suite 1105, 730 Fifth Avenue, New York 19, N. Y.

"I think it is obvious to all of us that nothing but harm could result to the retailer from this proposal (tariff increase) because of a necessary increase which we believe will follow in the price to consumers, and because of a general reduction in business which must inevitably follow."

—from the testimony of a San Francisco jeweler, representing a group of California jewelers, before the first U. S. Tariff Commission hearing in 1951.

"... the tariff would hurt us not only from the standpoint of reducing the purchasing power, but would be unfair to the number of jewelry stores in the United States that are in positions similar to us that do not have access to some of these American watch lines."

—from the testimony of a Charleston, West Virginia, jeweler, employing 200 people in 14 stores, before the same U. S. Tariff Commission hearing.

"If the increase were granted, a chain of destructive effects would be set in motion. American consumers would be confronted with higher price tags on watches. They would undoubtedly cut their purchases."

—from the New York Herald Tribune, February 10th, 1954.

"... many customers would be forced to go without much-needed watches ... (and) I believe that we would see an increase in the retail price of the watch to the consumer of somewhere in the vicinity of 3 to possibly 4 times the amount of the increased tariff."

—from the testimony of a Jacksonville, Florida, jeweler before the first U. S. Tariff Commission hearing in 1951.

"A. H. Barenboim, representing the Amalgamated Jewelry Workers Union, A.F.L., asserted that 40,000 workers were employed in this country in the assembling and processing of imported watch movements, and that their interests should receive as much consideration as was accorded those who worked only on domestic watches. He said that a curb on imports of Swiss watches would also hurt consumers in this country."

—from The New York Times, February 11th, 1954, reporting testimony before the U. S. Tariff Commission, February 1954.

"... we want to stress again the importance of the forthcoming Tariff Commission's recommendations in the Swiss watch case—and the importance of the President's decision in that case.

"The watch case, for our friends in Europe, has become a 'symbol' for our foreign trade policy. It has been blown up far beyond its economic importance, both here and abroad. It is for this very reason that the President's decision in that case is of such importance.

"The fact that the national security argument has been brought into the Swiss watch case with a vengeance, no doubt, complicates the whole discussion considerably.

"The security argument should be determined by experts in that field. But even if the expert judgment is that something must be done for the watch industry because of security considerations, we feel strongly that there must be a sounder way of providing such assistance than an increase in watch tariffs at this particular time."

—from an editorial in The Journal of Commerce, May 12th, 1954.

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Volume 21 July, 1954 No. 7

Advantages in Departures from Three Accepted Rules of Watch Design

By Dr. C. N. Challacombe
Asst. Director of Research, Elgin National Watch Co.

SOME 200 YEARS ago, with the introduction of the detached lever escapement, the watch began to settle down into the basic pattern of the present day watch, consisting of a "going" barrel, a train of gears, the detached lever escapement and a balance-hairspring oscillator. Two hundred years of developmental work, including the efforts of some of the most ingenious minds of the past two centuries, have failed to change this basic design. It is to be expected that certain "iron-clad" rules would evolve from such an extended developmental period along a single line.

"Iron-clad" rules have a tendency, as time passes, to be interpreted more strictly. For example, the rule stating that "a mainspring should occupy approximately one-half the space available inside the barrel" becomes "a mainspring should occupy *exactly* one-half the space available inside the barrel". Rules, in general, are valuable as guides in design. One is on dangerous ground, if he disregards completely an established, time-proven rule. On the other hand, some deviation from the strict interpretation of a rule is not only permissible but frequently advantageous in good design.

In this paper, I propose to discuss three accepted rules of watch design, to examine the range of permissible deviation, and to indicate some advantageous deviations. The three rules selected for discussion are:

(1) The length of run should be as long as possible, preferably of the order of two days.

(2) The length of mainspring should be so chosen that the mainspring occupies one-half the available space within the barrel.

(3) A balance should be as heavy as possible with the weight concentrated along the rim.

Starting with the rule concerning length of run, let us inquire into the origin of the rule. As watches became a part of our daily living, we acquired a habit of winding the watch daily. The problem therefore becomes one of designing for best performance assuming a period of 24 hours between windings. Since practically all major errors in rate are connected with a change in the amplitude of the balance motion, the balance must be maintained at a fairly constant level of motion for the 24-hour period.

The balance motion depends upon the

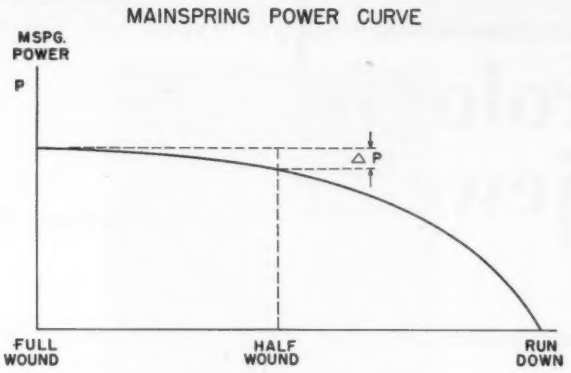

FIG. 1

power supplied by the mainspring, so, the next step is to examine the change in power of a typical mainspring as the watch runs down. This is shown in *Fig. 1.* Note that there is very little change in power during the first half of the run-down period. Therefore, by suitably gearing the entire run-down period to about 2 days, a reasonably constant power can be maintained by winding every 24 hours. Using only the first quarter of the run-down curve and winding every 12 hours would further reduce the power variation.

Then, why not make the watch run 4 days and wind every day? The answer to this question lies in the limitation of space available for the barrel. Generally, a watch designer will start by allowing as much space for the barrel as practical. The energy that can be stored in a mainspring is proportional to the size of the barrel which, in turn, is limited. Therefore, to make a four-day movement, the same amount of energy would be rationed out over a longer period, the power reduced, and, consequently, a smaller balance required. Reducing the balance size results in greater variation of rate for a given variation in the power delivered by the mainspring.

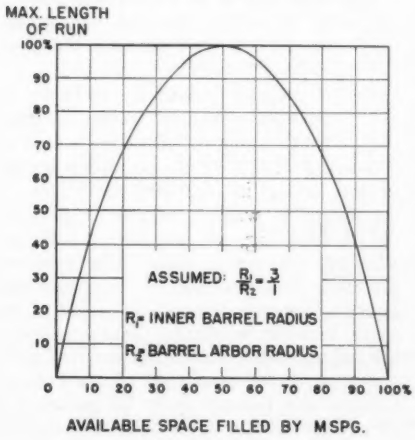

FIG. 2

There are other factors which become detrimental as the length of run is extended, such as increased thrusts on the bearing surfaces of the barrel and center arbors due to the higher gear ratios and increased torque necessary to extend the length of run. However, we can summarize the situation by saying that, given a specified interval between windings, for example 24 hours, an increase in length of run, gained by using a smaller balance, will reduce the variation of power in the 24-hour period but will increase the sensitivity to changes in power. It would appear that an optimum compromise between length of run and balance size should exist. Experience seems to indicate that the optimum exists for lengths of run somewhat less than two days.

At present, I would place the optimum

performance at a length of run of 36 to 40 hours. Placing the optimum length of run at this figure amounts to favoring a decrease in sensitivity to power changes by using a larger balance over the improvement gained in power stability by increasing the length of run. In general, we could set the optimum length of run between 1½ to 1 2/3 times the interval being timed between windings.

Furthermore, a watch designed to run one day between windings will give better 24-hour performance than one of comparable size designed to run 2 days between windings. You can readily appreciate where this places small 8-day clocks.

As most of you probably know, Elgin movements as a rule have lengths of run in excess of 45 hours. Since I have just placed the optimum length of run between 36 and 40 hours, perhaps a word of explanation concerning the discrepancy is in order. First, the trade reaction has been taken into consideration. Both the jewelers and the customers like the long length of run. The average wearer does not require split second accuracy but does depend upon his watch to keep appointments; take trains, etc. A "stopped" watch is annoying and even the most exacting person forgets to wind the watch now and then or does not fully wind it. The extra length of run provides extra leeway in winding and seems to be appreciated.

In our opinion, the sacrifice of insurance against "stopping" is not justified in order to slightly improve the rate. However, future models may have reduced length of run in order to improve the record printed on a timing machine by using larger escapements and balances to provide louder ticks. We have been rather obstinate about making our watches noisy in order to accommodate the timing machine but trade reaction indicates that we must relent. Secondly, our length of run has gradually increased in recent years through a concentrated engineering and research program to improve the mechanical efficiency. Each improvement results in a reduction of the power required which, in turn, results in decreased mainspring thickness and increased length of run. Therefore, we are in a position to sacrifice length of run in exchange for sufficient benefits such as improved rate and timing machine records but such changes involve complete redesign and new models.

* * *

At this point, let us turn our attention to the rule concerning the length of the mainspring. This rule originates from the first rule. In order to make the length of run as long as possible, both theory and experiment dictate that the mainspring should occupy one-half the space available inside the barrel. *Fig. 2* shows the percentage of the maximum length of run vs. the percentage of the available area within the barrel occupied by the mainspring for a typical barrel. It will be observed that the maximum length of run occurs when the mainspring occupies 50 per cent of the available area. However, if it occupies 40 or 60 per cent, the length of run is reduced by only 4 per cent. Therefore, the length of the spring is not at all critical and a sacrifice of up to 10 per cent in length of run is feasible if there is anything to be gained by it.

Let us next examine the effects produced by shortening and lengthening the mainspring. In *Fig. 3* these effects are presented qualitatively. Curve 1 represents a shortened spring occupying, let us say, 40 per cent of the available area. Curve 2 represents a spring occupying one-half the available area. Curve 3 represents a spring occupying 60 per cent of the available area. A dotted line has been arbitrarily drawn to represent the point at which the movement has run down 24 hours. The short spring of Curve 1 will give a higher full wound motion and less motion at the end of 24 hours than the normal spring shown in Curve 2. On the other hand, the long spring of Curve 3 tends to equalize the full wound motion of the balance with that occurring 24 hours later.

Therefore, we may conclude: (1) There is no advantage of shortening a mainspring below the accepted length filling one-half the available area; (2) There is a definite advantage in lengthening the mainspring, if some length of run can be sacrificed. I feel that I should take this opportunity to clear up a mystery concerning some so-called "long" springs which appeared briefly in Elgin's grade 650 movement several years ago. The grade 650 was the result of a concentrated

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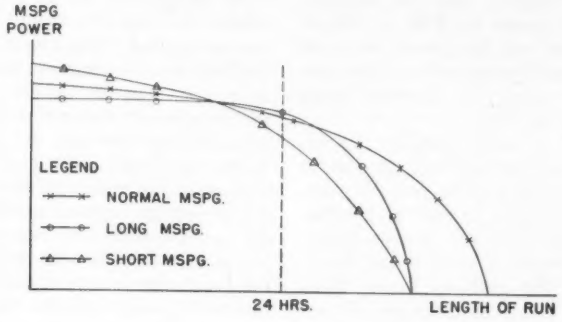
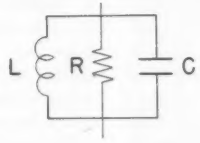


FIG. 3

effort to improve the performance of our grade 619 movement. This program was quite successful. We reduced the power required to such an extent that we had a length of run in excess of 50 hours. By experimentation we found that we could materially reduce the variation of balance motion during a 24-hour run by lengthening the mainspring. This, in turn, reduced all the errors due to a change in balance motion and these errors are more serious in small watches. Therefore, we started to use a mainspring occupying about 65 per cent of the available area. Unfortunately, we underestimated the power of Rule 2 in the trade.

We soon received quite a few complaints from the trade accusing use of placing the wrong spring in the watch. Further experimentation showed that there would be very little loss in the improved performance if we backed down to about 58 per cent. Therefore, we reduced the length by about 7 per cent and everyone was satisfied! Theoretically, the 65 per cent spring was correct. Practically, there



$$Q = \frac{X_L}{R} = \frac{2\pi f L}{R} = \omega \times \frac{L}{R}$$

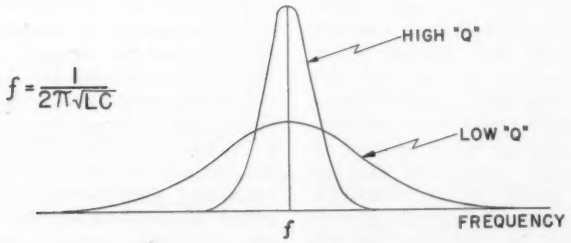


FIG. 4

is very little to be gained by exceeding 60 per cent probably because of excessive inter-turn friction, increased difficulty in winding into the barrel, etc.

Before proceeding to Rule 3, let us note how the remarks concerning the mainspring length tie in with those concerning length of run. If a watch has a length of run in excess of 40 hours using the customary mainspring which occupies one-half the available space inside the barrel, it is perfectly feasible to increase the spring length thus reducing the length of run while, at the same time, improving the performance over a 24-hour period. However, the length should not be increased to such an extent that the spring fills more than 60 per cent of the available space or the length of run reduced below 36 hours. The 36-hour minimum length of run is chosen to provide some leeway in rewinding. With a 36-hour length of run, a watch will maintain a reasonably good rate for 30 hours, in the event the wearer is not overly punctual in his rewinding habits.

The above discussion concerning Rules 1 and 2 does not depart radically from standard watch theory. However, for the watch designer's benefit, I hope that these remarks will serve to provide him with a little more leeway in design without having the roof falling in on him in the form of criticism from the trade. In the watch business, criticism from the trade is taken very seriously. Many fine improvements have been made as a direct consequence of such criticism. On the other hand, a designer is frequently restricted in making improvements by this cautious attitude towards trade reaction.

In choosing to discuss Rule 3, I am indulging myself a bit by taking an opportunity to present an idea somewhat radical in nature in view of past practices regarding watch balances. As in the case of the other two rules, let us inquire into the origin of the rule that a balance should be heavy with the weight concentrated along the rim. This rule has its roots in the desire to produce a flywheel effect. A flywheel in action constitutes a reservoir of stored energy such that minor fluctuations in the energy supplied to maintain a motion do not seriously disturb the motion. In other words, it keeps things on an even keel. In general, a flywheel is the more effective the larger its moment of inertia. A heavy material concentrated along the rim of a wheel will result in a large moment of inertia and a good flywheel.

In view of more modern theory of oscillations, the concept just advanced is somewhat over-simplified. In considering the merit of a balance as a timekeeper, we can profit by taking a tip from the electronics engineers and adopt their so-called *"Q"* factor. In *Fig. 4,* I have sketched an oscillating circuit. Such a circuit has a natural frequency *"f"* determined by the values of the inductance *L* and the capacitance *C*. However, if there is some resistance *R* in the circuit, the natural frequency is not a sharp and distinct frequency. The circuit can oscillate at other frequencies in the neighborhood of the resonant frequency. The range of possible frequencies is determined by the *"Q"* factor.

The larger the *"Q"* factor, the better the response to a single distinct frequency as indicated in the lower half of *Fig. 4*. Without going too deeply into electronic theory, one possible interpretation of *"Q"* is that it represents the ratio of stored energy to energy dissipated per cycle, and, at a given frequency, this ratio is proportional to the ratio of the inductance *L* over the resistance *R*. Setting up the mechanical analogy of the above circuit, in terms of a balance and hairspring, inductance becomes moment of inertia, capacitance becomes proportional to hairspring strength and resistance is analogous to frictional losses.

To investigate a *"Q"* factor for a balance and, consequently, the sharpness of response at a given frequency, we can use, as a measuring stick, the ratio of the amount of inertia to the frictional losses. By making several simplifying assumptions we can investigate this ratio. First let us assume that the major frictional loss is due to friction of the pivots, which in turn is proportional to the weight or mass of the balance. This assumes that the coefficient of friction of the pivots and jewels remains constant, and, the air resistance of the balance, and the internal friction of the hairspring are negligible. Any increase in these factors will lower the *"Q"* factor which we desire to keep as high as possible. Likewise, in order to keep

the calculation relatively simple, we will consider all the mass concentrated in the balance rim assuming a weightless balance arm.

In *Fig. 5*, the formulae for the moment of inertia, *I*, of a rim and the formula for the mass, *M*, are given. In order to investigate the *"Q"* factor, we take the ratio of moment of inertia to mass. We note the height, *h*, of the balance rim and the density, *d*, cancel out and the expression for *"Q"* simplifies to the outer radius of rim squared plus the inner radius squared divided by 2. In other words, the *"Q"* factor is independent of balance rim height and density depending only on the radical geometry of the rim. In order to have a large *"Q"* factor the formula indicates that the balance should have as large an outer radius as possible, the thickness of the rim should be a minimum making the inner radius large. The density of material selected is unimportant. There is nothing unusual or novel about the requirement that the balance must have a large diameter and thin rim.

However, proposing that the balance can be made of light aluminum as well as relatively heavy brass or beryllium copper is a rather startling deduction. Let us consider, for a moment, some of the advantages and disadvantages of making a balance of a light material such as aluminum. First, suppose we substitute an identical balance made of aluminum for a beryllium copper balance. The moment of inertia will be approximately one-third as large requiring a much weaker hairspring. This practically eliminates such a change in small watches unless higher beat frequencies are used. The hairspring is already so small and weak that it is a problem to manufacture and adjust. On the plus side, only about one-third the power is required to run the balance; therefore, a thinner mainspring can be used providing a greater length of run, and more constant power through a 24-hour period.

A second, and possibly a more profitable way of using a balance made of a light material involves a change in watch design making the balance larger in proportion to the barrel. Still another way of utilizing the lighter material consists of designing a balance with a wider rim without sacrificing the *"Q"* factor. This increases the poise stability of the balance and provides sufficient area on the underside of the rim for poising by drilling, etc. The balance of the future will probably have no screws. Screw changing is a nuisance and the screws occupy valuable space which if filled in with metal would increase the *"Q"* factor.

$$I = \frac{\pi h d}{2}(R^4 - r^4)$$

$$M = \pi h d (R^2 - r^2)$$

$$Q = \frac{I}{M} = \frac{\frac{\pi h d}{2}(R^4 - r^4)}{\pi h d (R^2 - r^2)}$$

$$Q = \frac{R^2 + r^2}{2}$$

$Q = \frac{\text{STORED ENERGY IN BALANCE}}{\text{ENERGY DISSIPATED PER SWING}}$

I = MOMENT OF INERTIA OF BALANCE

M = MASS OF BALANCE

R = OUTER RADIUS OF RIM

r = INNER RADIUS OF RIM

h = HEIGHT OF RIM

d = DENSITY OF RIM

FIG. 5

In closing, I wish to point out that the three rules discussed remain in effect. They are valid rules established by experience.

I have attempted to broaden their interpretation which has become too restricted as the rules have become more firmly established. The horological field is old and well established. Under such conditions, we tend to freeze our ideas and resist change. We must guard against this for nature repeatedly shows us that anything that quits growing starts decaying—nothing stands still. In one manner or another, this presentation has been geared to gently jostle several old established rules in order to stimulate thinking and soften resistance to change. We stand at the frontier of an era of numerous radical changes. The next two decades will probably introduce an entirely new type of watch mechanism. We must create a frame of mind receptive to change and progress in order to expedite and not retard the changes which will certainly come in spite of any resistance.

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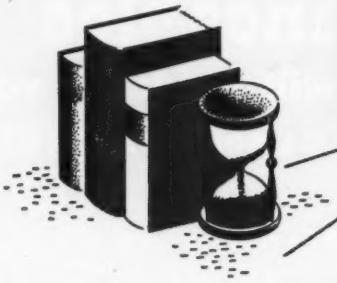

INFORMATION *Please*

SWP: If space permits, will you tell me how much one cubic inch of gold, also one cubic inch of silver weigh?

Answer: One cubic inch of gold weighs 11.136 ounces avoirdupois, one cubic inch of silver weighs 6.048 ounces avoirdupois.

JK: I am sorry to say I missed considerable schooling and my mathematics are very limited. I have a lot of trouble when fitting a new hairspring. How many vibrations must the balance make to show correct time? Can you give some simple way that will save time and worry?

Answer: Here is a quick way that such calculations can be dispensed with. If the watch has a second hand you are safe to proceed. When the fourth wheel has ten times as many leaves contained in escape wheel pinion, you then have an 18,000 beat watch. When the fourth wheel has 9 times as many teeth as escape wheel pinion has leaves, you have a 16,200 beat balance per hour. If the fourth wheel has 8 times as many teeth as there are leaves in the escape pinion, it is then a 14,400 beat balance per hour. The following table shows different beats per minute:

19,800 vibrations beats 5½ times per second or 330 per minute.

18,000 vibrations beats 5 per second or 300 per minute.

16,200 vibrations beats 4½ per second or 270 per minute.

14,400 vibrations beats 4 per second or 240 per minute.

Old Swiss levers and Swiss duplex watches, clylinder watches as well as most American-made watches and modern English lever watches have an 18,000 beat per hour balance.

The marine chronometer instrument has a 14,400 beat per hour. Nearly all modern watches have a train of wheels to show seconds—that is to say, the fourth wheel revolves once per minute and carries the second hand. In that case, the above methods may be followed.

This rule has exceptions, however, and when you find a watch that does not show seconds it is a good rule to count the entire train to determine vibrations balance must make per hour.

TM: It seems there are quite a lot of antique watches made by Tobias of Liverpool. I have run across several of these watches while scouting for additions to my collection. Can you tell me about Tobias and his watches?

Answer: From references we find that Michael I. Tobias started his career as a watchmaker in Liverpool, England, about 1810. He specialized in exporting English-made watches to the American trade.

Shortly after 1820 he discovered he could have watches made in Switzerland for less cost than in England and on this advantage he built a vast export business to the United States. The watches were engraved as if they were made in England to sell on the high grade reputation English

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Directed by
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watches then had in the American market. The Swiss watches were engraved "M. J. Tobias" where the English-made watch was engraved "M. I. Tobias".

RP: I have two key wind watches on which I would appreciate information as to their age. One is an Elgin 9,130,745, the other is a Hamilton 1,015,763.

Answer: From our reference chart we find both of these watches passed their final inspection and were put into service during 1900.

FAB: Which is the most important, to have a balance wheel nice and true with a slight flicker hardly detectable to the eye or to have a balance wheel well poised that shows quite a flicker detectable to the eye?

Answer: The only real answer to your question is that the balance should be perfectly true in the round and the flat. Truth and poise are so closely related and practically inseparable that nothing is gained by saying which is the more important. Practice until you can true the balance without a flicker, then poise it on a good poising tool, being careful to have a perfect poise. You will then have taken two important steps in the right direction on good workmanship and better timekeeping.

JMCD: Some time ago, when staking the staff fast to the balance wheel, I evidently was too heavy with the hammer or was using the wrong punch—at any rate, I found the balance arm split at the hole. I was disgusted and ordered a new balance unit complete. Now that I have cooled off, I am wondering if the wheel could have been made usable by soldering the break?

Answer: There is no hope for making a good job such as you have in mind by repairing the balance wheel. If soldered with hard solder the heat would spoil the arm or even burn and overheat the rim and if it was a compensated balance, it would be ruined entirely. An easy flowing soft solder requiring very little heat to flow would not hold the crack together when staking on the staff, so it would have only been a waste of time to resort to solder. Putting in a new balance wheel was the proper way out of your trouble.

AM: I occasionally find, when assembling a chronograph, that some spring or other is resting tight on the plate, preventing free action. Is there any way of bending the spring without softening it in order to make the bend and then re-hardening and tempering the spring to a blue?

Answer: Bending a tempered spring is a risky procedure, however, it is usually possible to make a small bend or correction by placing the spring on a flat lead block, holding the spring in position with a brass punch at the base of the bend and tapping it gently until a small or slight depression is discernable in the lead block.

Done with care and discretion, this will usually free the end of the spring from contacting the plate. The same procedure can also be applied when more or less tension is required on the spring.

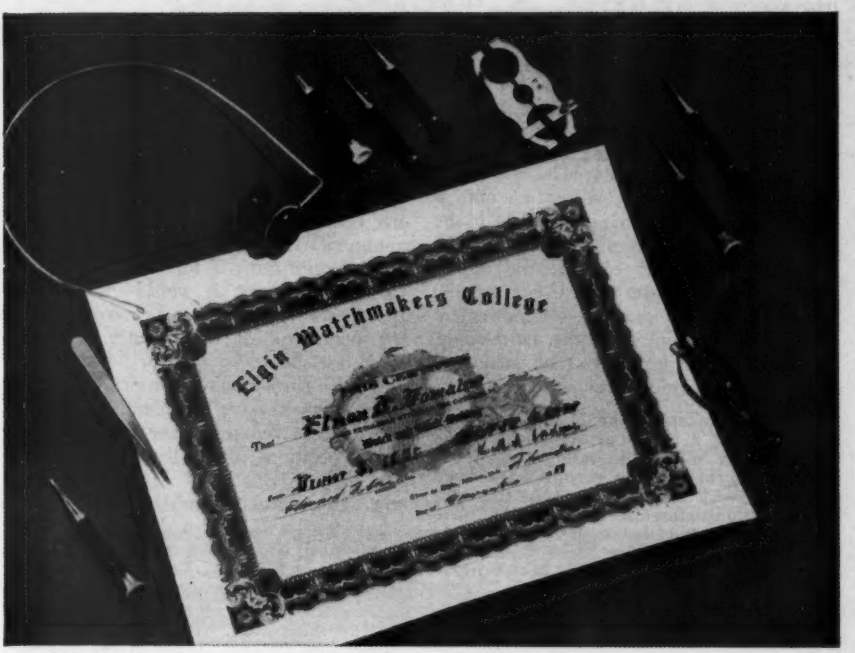
SHW: Will you give me the system or table for weighing gold or silver.

Answer: Gold is weighed by troy weight along with silver and all precious metals as follows:

24 grains—1 pennyweight
20 pennyweight—1 ounce
12 ounces—1 pound

JAN: I have a Swiss key wind watch in which the barrel is badly out of flat—it either rubs the center wheel or lower plate. Will you tell me how I can remedy the trouble? I tried to buy a new barrel, but was informed that none were available for this watch as the watch is hand made.

Answer: To restore the barrel to working order is quite easy, but it takes some time and care. Your first step would be to open the hole in the cover and barrel about 25%, insert solid bushings, after that snap the cover to place, marking locating dots on the cover and the side of the barrel so the cover can be replaced in the original position. Provide a flat cement chuck large enough to hold the barrel and check it for truth in the flat, re-facing it if necessary. Now cement the barrel to the cement chuck and as the lathe is revolving, hold pegwood against the teeth of the barrel, truing the barrel so the teeth are perfectly true in the round. This is done while the cement is still soft. Spot a center in the barrel cover and drill a hole slightly smaller than the barrel arbor bearing, then bore the hole with a hand tool or by using a slide rest to fit the barrel. Now remove the cover and spot a center in the bushing in the barrel, drill a small hole and bore the hole to fit the barrel arbor bearing. When this is com-



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pleted, you will find the barrel will run perfectly true both in the flat as well as in the round.

JNF: I took in a silver bracelet and after making the necessary repairs, I found the oxidized finish was ruined. How can the oxidized surface be restored?

Answer: To oxidize silver is not a complicated job. Expose the article to be oxidized to the fumes of sulphur, the sulphur fumes will blacken the whole article. After that the high lights may be rubbed off with some very fine emery cloth leaving a contrast to the depressions, and finally, the article can be lacquered to make a permanent and pleasing finish.

JCE: Quite often I take in a high grade watch either a Swiss or American make which has a bi-metallic balance and I observe that the balance screws have been tampered with and I realize that the temperature adjustments undoubtedly have have been destroyed. I would like to know how I can recompensate the balance to make it keep time for temperature changes?

Answer: After you have put the watch in the best mechanical order and regulated it to close time in dial up position, the one position that we rate a watch in for temperature, we can go ahead and make the temperature test. It would be a loss of time to put a watch through position tests if the temperature errors are the greater, so high grade watches are always put through temperature tests and corrected to a minimum tolerance or less than the tolerances allowed for position rates.

In the watch factories they have special equipment such as electrically controlled ovens and cold boxes and the average change in temperature for the pocket watch may range from 45 degrees to 95 degrees F. However, you can, with a little effort, make a warm box from wood or tin about 10 inches square with a door on one side for access. On top make a ventilator that can be opened or closed allowing air circulation and a small opening at the bottom. Inside the box mount an electric light bulb, a thermometer and a shelf to lay the watch on—at very little extra expense you can incorporate a thermostat to control the heat. For a cold box the regular house refrigerator serves the purpose very well, as you can regulate the temperature required.

Compensating the balance is accomplished by changing the position of the balance screws and when changing these always change two opposite screws. On your first test in the warm box the watch may show a gaining rate compared to the cold test, this will indicate that one or more screws will have to be moved away from the open end of the balance. This will automatically have the reverse effect on the opposite test—if the watch loses time in the warm test, it would indicate that the screws would have to be moved toward the open end of the balance.

Each test should be run for 24 hours and you will find moving the screws on the open end will have considerable effect on the rate, so you may have to change the screw positions along the center of the rim for closer rating. After a few trials you will eventually find that the cold and warm tests will be equal.

NMR: Will you let me know if you have a booklet showing the market value of old time watches? I have a key wind Elgin having the following number No. 333,329 on the movement. It also says Dexter Street and Patent. What is the approximate value?

Answer: To this writer's knowledge, there are no books on the market giving values of old timepieces. The watch you possess was made by Elgin in 1874 and as for its value as a collector's item, it would not be any outstanding amount, as there were many of these model watches made and there is no scarcity from a collector's viewpoint.

KTM: I have a lot of trouble when picking up small screws and jewels with their snapping out from the tweezer points. What can I do to prevent the snapping of these small parts which cause so much lost time or loss of cash in purchasing new parts?

Answer: There could be several reasons causing your trouble, you may be using tweezers with delicate points, not suitable for assembly work. You should use a pair of tweezers suitable for assembly work—the points can be fairly soft but firm. To use such a tweezer, first dress the points to equal length and thickness, using a fine file, then with a thin, flat file, inserting it between the points of the tweezers, draw the file lengthwise, seeing that the points of the tweezers when closed are parallel.

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Filing lengthwise with the points leaves fine lines and these fine lines will have a tendency to hold the part from snapping out. It is taken for granted that soft pointed tweezers will not wear as long as the hard pointed tweezers, but it takes only a few moment's work to redress the points and the time is well spent.

Sharpening the points crosswise with a stone or file does not always leave a dead flat surface, rather a rounded surface and if the points are dead hard you will have a polished surface. This is the cause, more often than not, of material snapping out of tweezers.

WNW: I have a lot of trouble with mainspring breakage after using a mainspring winder for certain mainsprings—it is no time before the spring breaks. Do you suppose I have a lot of poor mainsprings or am I doing something wrong?

Answer: There can be two reasons for your trouble. First, you may be using some brands of mainsprings that are too hard. It is always best to use genuine mainsprings made by the maker for the watch you are repairing. Then it is possible that the hook in the winding arbor is too long and extends through the mainspring. If this is the case, the extra long hook will cause a hump on the first turn of the mainspring or maybe a fracture which in a short time may be the cause of a broken mainspring.

See that the hook in the mainspring winding arbor is no longer than the thickness of the mainspring. After following these suggestions you should have no further trouble.

BD: I have had many years at the bench and am now located in a part of the country where I find many marine chronometers that require cleaning. However, I have not had the experience or the opportunity of servicing these instruments. Will you publish a few highlights that may be profitable?

Answer: You say you have had many years experience at the bench, but have not come in contact with chronometer work. A marine chronometer is only a very fine portable timepiece and the same care observed in taking a watch apart will succeed with a chronometer, however, when you go about disassembling a chronometer, I suggest you first remove the hands and dial.

I cannot warn you too forcibly to release

the mainspring power; this can be done with a let down key the same as you would let the power down in an ordinary clock. After the mainspring power is entirely let down and the chain loose, I will warn you again, let down the retaining power by raising the retaining click pivoted between the plates and engaging the fine ratchet on the main wheel. This will release all remaining power on the train.

You may now remove the balance without creating any damage to the escapement. In other words, don't ever attempt to remove the chronometer balance before releasing the power when dis-assembling a chronometer.

If work is to be done on the balance, the balance wheel can be removed by blocking the escape wheel, arresting the power. For cleaning the instrument you can go about it the same as you would any ordinary watch, cleaning all double jewels, removing the mainspring, cleaning it thoroughly using a mainspring lubricant which can be procured from your jobber.

When replacing the chain, one way is to attach the chain to the mainspring barrel and carefully rotating the barrel until all the chain is taken up, then hook the end to the fusee. Now replace the ratchet wheel and set up the mainspring approximately ⅔ turn, then carefully wind the chain onto the fusee. Usually it is not necessary to test the balance for poise, but it is not a useless precaution.

A chronometer is built to run for over 50 hours, the extra hours is to prevent the instrument from running down if the regular 24 hour winding is omitted. After assembly, oil all pivots, but do not oil the escape teeth, locking jewel, impulse jewel, unlocking jewel, or the gold spring, as in time the oil may become gummy and affect its constant rate.

RHC: Will you please tell me through your column how to use and the uses of bismuth solder?

Answer: Bismuth solder melts at 225 degrees F. and is used for soldering metals where very little heat can be applied, such as white metal, jewelry cast in white metal composition such as buckles, brooches, millinery trimmings, etc. It can be used with a small soldering iron, however, it takes practice and skill to solder a joint or make any repairs on the above mentioned articles.

There is always the danger of having the soldering iron too hot or holding the soldering iron too long on the piece, causing the piece to melt or be seriously damaged.

LYN: Occasionally I am called on to replace a broken suspension spring for the anniversary or 400-day clock. After fitting the spring, the clock either gains or loses considerable time. How can I bring the clock to time?

Answer: You say you fitted a new suspension spring, regardless of strength or thickness. No doubt a piece of the old spring remained which was of the right strength, and by selecting a spring of the same thickness you should have no trouble making the clock keep time. You should provide yourself with a reliable micrometer and for that purpose, one that reads in the thousandth inches, as suspension springs are made in assorted thicknesses and listed in thousandth inch. If the old spring and attachments were lost, then you will have to determine the vibrations the spring is to make per minute in order to select or fit a spring of proper strength, the same as you would for selecting a spring of proper length for a watch.

Ordinarily the 400-day pendulums make 8 vibrations per minute, but we do have some variations. To make certain the vibrations the pendulum is to make, multiply the number of teeth in the center wheel by two times the number of teeth in the escape wheel and divide by number of leaves in the escape wheel pinion. Results will be number of vibrations pendulum makes per hour. Divide by 60 for number of vibrations pendulum makes per minute.

If there is an intermediate wheel between the center and escape wheels, include the number of teeth and number of leaves in your problem. You will find that Horolovar suspension springs come 12 in a package of assorted springs. They are made from special material that is not affected by changes in temperature like the bronze or steel springs, and by using them you can really make a 400-day clock keep very satisfactory time. These springs can be obtained from your jobber.

TLW: One evening our speaker mentioned something about a "free spring." What was he referring to? It was the first time I ever heard the term.

Answer: A free spring means the hairspring not controlled by regulator pins and may be found in marine chronometers and some fine pocket watches. The hairspring is attached to the collet and hairspring stud, the same as any hairspring. Regulation is accomplished by the use of meantime screws only.

GHD: I have a lot of trouble getting the escapement to work. I've tried all kinds of alterations and lose a lot of time. Is there any instrument that one could use by moving the pallet stones so as to adjust them to their proper working positions the very first time?

Answer: From your question it sounds as though you are looking for some device to set the pallet stones without the fundamental knowledge of escapements. It is true the watch factories have such tools or jigs that are made for the particular model watch in production and a special jig is required for each model.

For the bench watchmaker to carry a jig for all the different watches would be impossible and expensive. There are tools on the market called pallet stone setters; these tools offer a convenient way to hold the lever when applying heat to soften the cement in order to move the pallet stones. Some of these pallet stone setters are equipped with a small lever and finger that can be made to come in contact with the pallet stone, forcing it into position.

There is also a small scale of lines that indicate the amount the pallet stone is moved, however, that tool does not set the pallet stone in its proper position without the knowledge required about the escapement. If you lack that, we advise you to study books on the subject or attend a good school where you receive information and instruction on the proper method of matching up the escapement. You may obtain a list of books pertaining to escapements from the Book Department of the American Horologist and Jeweler simply by postal card request.

IM: Recently I purchased a set of tools and a quantity of material that belonged

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to an old watchmaker who had passed away. Among the material I found a quantity of diamond powder and this is labeled 'mixed.' Is there any way I can sort the coarse powder from the fine powder so I can use the fine for polishing pivots, charging laps or work such as re-sharpening gravers, or any other special jobs?

Answer: To have graded diamond powder on hand is very helpful for special jobs, but the writer does not recommend use of diamond powder for polishing watch pivots, especially balance pivots, as there is always a danger that the diamond powder may become imbedded in the pivots and, naturally, these diamond charged pivots will cut the jewels, but for other, such as mentioned, diamond powder is recommended. It would be worth your time and effort to grade your mixed diamond dust for other uses than to polish watch pivots. The following procedure will give the desired result: Assuming that we have a lot of diamond powder on hand that requires grading, we would procure five small glasses about one ounce capacity. The individual glasses which are used in communion service and which have a flaring lip are suitable for the purpose. The glasses are numbered one through five.

Clock oil is suitable for grading diamond powder; we fill glass No. 1 about two-thirds full of oil and then add the diamond powder, stir well in order to mix the powder thoroughly with the oil. Allow to stand for 5 minutes, then the very coarse grains of diamond powder will settle to the bottom of the glass. Pour the top oil and diamond powder which is held in suspension into glass No. 2, and allow to settle for 35 minutes. Then pour into glass No. 3, allowing to settle for 3½ hours, pour into No. 4, allowing to settle for 24 hours, then pour into No. 5 which is allowed to settle for several days until the oil is perfectly clear.

The diamond powder which was left in No. 1 will be very coarse, in fact, it will be too coarse for any fine work. It should be washed clean with benzine and allowed to dry if we are to use it later on. The powder left in No. 2 is the grade we can use for charging copper laps, No. 3 is applied to boxwood laps and used for removing pit marks from end stones, No. 4 is for polishing jewels, etc., while grade 5 will produce a final polish.

WO'D: I have had the misfortune of losing a fourth wheel and pinion from a Swiss key wind watch. I timed it on my timing machine before I took the watch apart and the chart showed a straight line evidencing that the balance beat 18000 per hour. Can you tell me from the remaining train what number of teeth in the wheel and number of leaves the pinion should have? Center wheel 80 teeth, 3rd wheel 75 teeth, escape wheel 15 teeth, 3rd pinion 10 leaves, and the escape wheel pinion has 7 leaves.

Answer: The following example will show you what the ratio between the fourth wheel teeth and the fourth wheel pinion must have:

$$18000 = \frac{18000 \times 10 \times 7}{80 \times 75 \times 15 \times 2} = \frac{7}{1}$$

You can now select a fourth wheel and pinion where the wheel has 7 times more teeth than the leaves in the fourth pinion—using a 70 tooth wheel and 10 leaf pinion we have the following proof:

$$\frac{80 \times 75 \times 7 \times 15 \times 2}{10 \times 10 \times 7} = 18{,}000 \text{ beats per hour}$$

"Remember, dearie, Brontosaurus teeth are a girl's best friend."

Watchmaker's Contest

A.H.&J. Reader Ideas on Practical Bench Methods, Experiences or Tools.

A. H. & J. is pleased to announce the following winners of its fourth month's (June, 1954) Watchmakers' Contest:

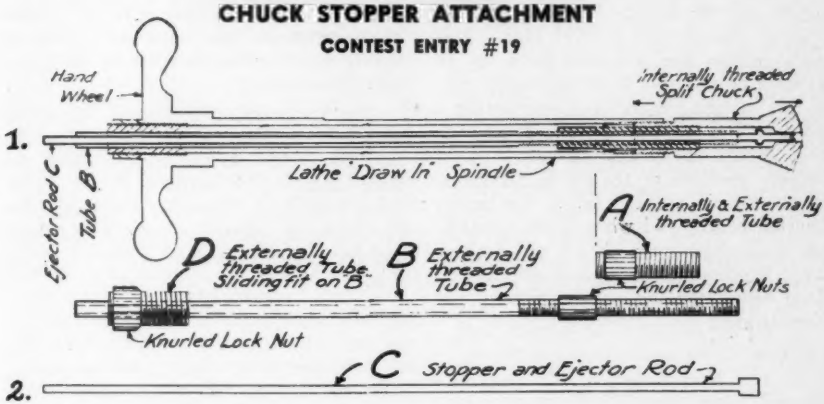
First prize: Algren spring bar kit, 144 assorted sizes goes to Mr. R. E. Graddy, 13315 Emporia, Houston 15, Texas, for his "Waterproof Case Opener Tool," Contest Entry #18.

Second prize: One set of three Lampert jewel setting openers, plus one Gruen case rest goes to Mr. Woodrow Young, 221½ Plaza, Madill, Oklahoma, for his "Fitting Watch Stems Perfectly," Contest Entry #15.

Third prize: Parts cleaning holder, cleaning brush and movement holder goes to Mr. Peter A. Rusatsky, 241 Orchard, Bridgeport, Connecticut, for his "Asbestos Cover to Hold Heat," Contest Entry #17.

INTERNALLY THREADED LATHE CHUCK STOPPER ATTACHMENT

CONTEST ENTRY #19



ASSEMBLY—

1. Screw Tube A on to Tube B until B projects slightly through A.
2. Slip Ejector Rod C into the threaded end of Tube B.
3. Screw internally threaded Split Chuck on to A, draw up snug and Lock nut.
4. Adjust Tube B to suit conditions of work, tighten Lock nut against Tube A.
5. Place entire assembly (A-B-C with chuck) into head stock of Lathe, push through the "Draw-In" Spindle and screw up Hand Wheel.
6. Slip Tube D over Tube B, screw D into outer end of "Draw-In" Spindle, which has been internally threaded to fit, tighten the knurled Lock nut. Tube D is to hold assembly in alignment and prevent "Whip" when lathe is speeded up.

A. Length of brass pipe to rest bezel on. ⅜ x 1¼ x ⅛ inches.
B. Softer material cupped to fit crystal.

Base slotted to take clamp, held by set screw. Could be brass or other.

1. Assembly in position to receive a balance staff and hold it in alignment until chuck is tightened. Eject by loosening hand wheel, then pushing Rod C. A similar rod with a flat and polished face can hold very short parts like washers in proper position. A watch jewel mounting can be held at the very face of chuck and a jewel burnished into it without tipping over.

2. Rod with end shaped as shown with true and polished face can be adjusted to limit the depth to which pieces can be inserted into the chuck. Pieces can be removed and re-inserted quickly and easily into the same position, therefore, will run more true than if inserted in some other position. Tube B is adjustable, it can be set for cutting off of pieces of stock to length.

Patented August 25, 1950 #2,650,098

BENCH BLOCK
CONTEST ENTRY #20

Having known several watchmakers and visited several jewelry stores, I have yet to see a bench block which is used at the Waltham factory.

The block is 8x4¾ inches, and it extends out from a watchmaker's bench where it is nailed or screwed down below the top surface of the block. The top of the block is covered with a white card. This block enables the watchmaker to do all his work of assembly and disassembly, etc., on this mounted block thus eliminating a slouched and bent over position as with the ordinary watchmaker's bench.

Every graduate of the N. E. School of Watch Repair adapts this to his newly acquired bench, and when I see a watchmaker slouching over a bench without this block, it gives me the urge to inform him of an easier way and a more relaxed way of repairing.

OILING MAINSPRING WITH TAPE
CONTEST ENTRY #21

A ten-cent piece of double fold bias tape (white) stored in an ordinary job envelope to prevent soiling may be slipped out the end without touching, and small patches cut from it about ⅛ to 3/16 inches long. Soaked in oil, these are very handy to oil mainsprings when held between tweezers and spring drawn through following the curve as you go.

I have used this for some ten years and find it very satisfactory. As the cloth is bias it seldom leaves any lint on the spring.

CLEANING INCABLOC SETTINGS
CONTEST ENTRY #22

I should like to enter my suggestion for cleaning Incabloc settings in the readers' contest. The problem seems to be how to separate the cap jewel from the hole jewel setting with the least effort.

Take a rod and put a ball of beeswax on the end, and work it to a point, then open the springs, leaving the setting in the plates. Hold the setting with the points of your tweezers and touch the cap jewel lightly with the beeswax which will very readily pick it up.

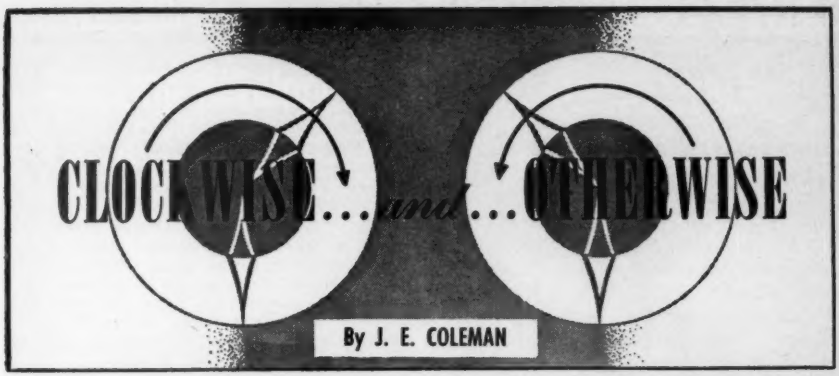
Close the springs, leaving the hole jewel setting in the plates for cleaning. Dip the cap jewels in carbon tetrachloride, and wipe clean. This method almost eliminates loss, and definitely eliminates the possibility of damage to hole jewels from pushing the cap jewel off from the other side.

1-2-3 winners among this month's entries will win the following prizes:

First prize: One Arnold Universal case opening wrench.

Second prize: 12-piece lathe set consisting of grinders, buffs, brushes and end mills, plus one case rest.

Third prize: Parts cleaning holder, cleaning brush and movement holder.



OTHERWISE

This is not a "point of order," rather it is an observation. Several months ago one of our readers received a fine chronometer for cleaning and adjusting; the job was carefully completed, for he was a competent horologist, and he had handled a few similar pieces over the years. It timed out nearly ten seconds per hour off—immediately he set about to correct this error and in due time the piece was delivered with the assurance that its rate was quite satisfactory.

Ten days later it came back with the complaint that it was off some ten seconds per hour, and it was only then that the repairman awoke to the difference between sidereal time and mean solar time. Shortly after this incident, we noted a similar one in Mr. Samelius' "Information Please," a little later we were told of another workman's trouble regulating a piece to drive a telescope, and just last week we had a watchmaker tell of servicing a very fine clock, which clock was being used to drive a mirror for some type of observing reflected sunlight.

The observation is: it seems that most horologists have overlooked such chapters as the first in Eric Haswell's "Horology," or the first chapter in Professor Willis I. Milham's "Time and Timekeepers." Astronomy and timekeeping are so closely interelated that it is quite difficult to completely separate them.

If you missed the article on page 42 in The Saturday Evening Post for April 24, entitled "The Stars Are His Playthings," see if you can't dig it out—mighty good reading. Prior to 1945 the mention of the word "planetarium" brought thoughts of a three-ton instrument manufactured by Carl Zeiss Company of Germany, costing well into six figures, in fact, only five cities in the U.S.A. could boast of having one.

In 1945, Armand Spitz, director of the educational department of the Franklin Institute and operator-lecturer of their big Zeiss instrument, began thinking of planetariums as Eli Terry thought of clocks back in 1797, i.e. one to fit every pocketbook. Like Terry, he did it—it was our good fortune to meet him on one of his trips to our town when he personally supervised the installation of one of his medium size instruments about five years ago. We are not sure that Terry ever envisioned the 79c alarm clock of a few years back, but Mr. Spitz has pushed his vision to a little instrument that will retail for $14.95. It shows approximately forty constellations of about 300 stars; it can be operated in any room in total darkness, regardless of size or shape, and has an adjustable calibrated base enabling the operator to set it correctly for his geographical location and for any given month of the year.

Our thought in connection with the

Mr. Coleman invites your questions. If your question requires a direct answer, please enclose a self-addressed, stamped envelope. It is impossible through correspondence to give valuations of antique timepieces; questions of this nature cannot be answered

Spitz's Planetarium

observation is: the junior planetarium might be a good investment for Guilds—they could bone up on a little astronomy, after all, the earth is the "master clock" by which we regulate our pieces whether it be 1. sidereal time, 2. apparent solar time, 3. mean solar time, or 4. standard solar time. Active Guilds are going before civic clubs, high school science classes, etc., with talks on time—it could be worked into that program easily.

If some college near you sent in a chronometer and you ascertained same was to keep sidereal time, how would you regulate it? If you have the latest copy of "The Jeweler's Dictionary," turn to page 185 and you read: "The sidereal day is 3 minutes, 56 seconds shorter than the mean solar day." Should you happen to have "Watchmakers & Clockmakers Encyclopedic Dictionary," try page 132 and read: "A sidereal day is approximately 3 minutes, 56 seconds longer than a mean solar day." Confused? Wouldn't a little serious study plus some visual demonstration so fix it in your mind that there would be no chance of confusion?

Hamilton Pease of Providence, Rhode Island, is following the column pretty closely and cooperates with the following letter:

Dear Mr. Coleman:

I have noticed several calls for American clock verges in your column. They are advertised on page 6 of the new catalog from Herman's Clock House, 628 Coney Island Avenue, Brooklyn 18, New York.

Also an inquiry about Howard gravity escapement regulators. Some were made for observatories. One is the Ladd Observatory in Providence and several in the U. S. Naval Observatory in Washington. I saw one when the H. I. A. group was shown around there recently. I believe a letter of inquiry to the observatory would bring more details.

HAMILTON E. PEASE

* * *

A splendid bit of cooperation from Seth Thomas. L. A. McDonald, sales office manager (Thomaston, Connecticut), is loaning the column three photos of the ship's bell, No. 115, eight-day, key wound movement and supplying for the files a typed list of parts. Now, will some reader lend or sell us one of these movements? (Don't ship it—just drop that card and wait for an answer.) We can't have one of Seth Thomas' as they were discontinued and not a single movement remains in the factory at this date.

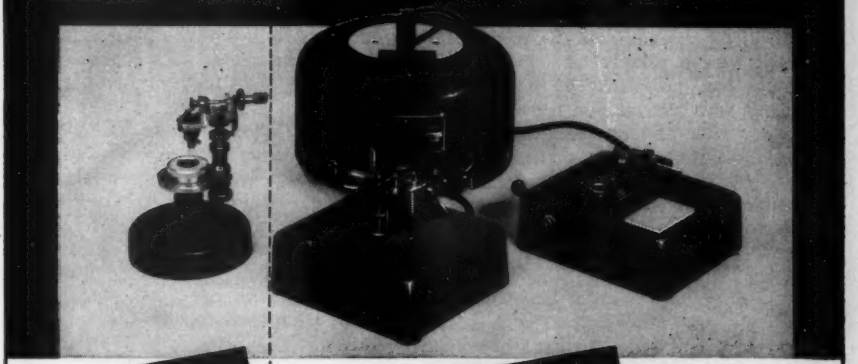
We've had several inquiries for service information on this piece and a look-see at a movement with the data in hand will enable us to answer all future queries on it.

I quote one paragraph from Mr. McDonald's letter: "We can well appreciate the effort you are putting forth in not only this particular phase of clockmaking, but all other types as well and while you perhaps already realize that we are no longer manufacturing the genuine Ship's Bell clocks, it will be necessary to provide service for them over a period of several years."

* * *

Some very fine technical data from Richard Slaugh of Hamilton Watches, and we are grateful for this cooperation. When Clockwise & Otherwise was first conceived, it was my thought at least, that supplying data and assistance to the bench mechanic would be its scope; i.e. we never thought of its going beyond helping him with his repair problems. As

Amazing development in hairspring vibrating!



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Frequencies range from 4 per second for **WATCHMAKERS** to 100 per second for: Research Laboratories • Jet Aircraft • Bureau of Standards • Guided Missiles • Atomic Energy Commission

New! An **ELECTRONIC EAR** picks up the frequency of the balance in exactly the same manner that it functions in the watch or instrument. Does not inject errors such as bouncing the wheel or interfering with hairspring movement.

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- ✓ **Every hairspring is returned in beat, properly timed, leveled, centered and attached to the bridge. This is made possible through our patented method . . . VIBRA PAC.**
- ✓ **Every hairspring is unconditionally guaranteed. A new spring FREE, if spoiled for any reason.**
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time passes we get many kinds of inquiries from many people not bench mechanics—in practically every instance it is quite evident that we can and are being of direct assistance to a bench mechanic if we can comply.

"John Doe," clockmaker, has a host of friends who turn to him for all points concerning time and timekeepers and we are sure that it is of very definite worth to him if and when we can aid him in maintaining that confidence his friends and associates have placed in him.

Now, Joe's friends do not expect him to have all the answers, neither do they expect him to maintain a large library and file of data. They know he is busy at the bench, but they feel that his being within a profession gives him access to and help from that profession. Never let it be said that C. & O. didn't try, be it a school youngster writing a paper on time or an idle argument that the hands on watchmaker's signs are set at 8:20 because that is the time some president was shot.

* * *

The highlight of this month to us was when Reginald C. Morrell, member of the board of directors of the National Collector's Association and curator of the Bristol Clock Museum, returned to Bristol via Nashville after delivering one of the major addresses at the tenth annual convention of the Collectors' Association at Canton, Ohio.

We weren't able to attend the Canton meeting and it was indeed a treat to get a first-hand report the very next day, and it was even a greater thrill to hear Mr. Morrell detail what the Bristol Clock Museum already has, and what it expects to do. A year or more ago we expressed through this column the hope that it would render other services than merely exhibiting pieces to those visitors who are fortunate enough to make a trip to Bristol. Hearing him describe those services they will render was like seeing a dream come true.

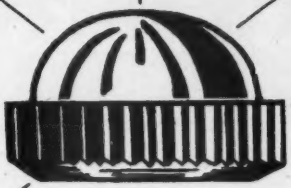
I am privileged to quote a few excerpts from his Canton address: "We like to feel that this museum was organized to be a memorial to the great American clock industry which, I believe, we will all concede to be the fundamental motivating force at least to the entire American industrial system.

"With this fundamental concept of a public offering we went forward to determine what we might do to render service to the public and to those who are interested in clock history. To that end we are establishing a very lovely library with a very unique index system of clocks, manuscripts, photos and clips of information of any sort so that utimately any clockmaker may be studied from a folder where all known references to his work may be immediately at hand. A very extensive photographic library is in formation with over 400 photographs available at the moment.

"All of these services and all of this visitation will be without charge to the public or collectors—we do hope that this library will become the repository of all that information that is now scattered over the country and in the hands of so few, so that it may be made available to all.

"Another project which we have in mind, and with plans somewhat put together, is for the establishment of a registration bureau for fine clocks. With future files of photographs and information and description that we have of over some 350 clocks at present and over 200 items in our library, where better could this information be collected and become available through photographs and words than in the Bristol Clock Museum.

"The project can develop itself to great lengths in the study of some of these fine old clocks whereby complete photographic records, descriptions and information will be filed and catalogued for future reference and the clock given a registry number in the museum, the owner being given a registry tag to affix to the clock and a certificate for framing. How important will that be as succeeding generations come along and are interested in this great field of horology, for the owner of a private clock, who perhaps is not interested in the clock other than a personal family heirloom, to say when they are approached relative to its study, this is entirely detailed and registered in the Bristol Clock Museum, registry number so



NEWALL

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★ 3 STYLES OF SNAP-IN POSTS

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and so. A few years from now it will indeed be a thrill to make studies of these various clocks and clockmakers.

"As the library and its files, both by items and photographs build up, we are going to be more and more in a position to aid you and your study of clocks and clock lore, and if we may aid you we feel that we have been of service.

"I have talked entirely on what we might do for you and now I would like to briefly mention what you might do for us. Our intense desire is to preserve horological information, old books, account books, memorabilia, letters, and anything at all pertaining to the old clockmakers of America. The Bristol Clock Museum is a museum devoted to American clocks and watches and not, as is commonly and erroneously presumed, to be devoted to the Bristol clockmakers.

"The interest in our exhibit has been tremendous. The great collection of Edward Ingraham, and the collections of Charles T. Treadway and Dudley Ingraham were given to us as a start. Many, many others over the country have contributed clocks, tools, books and memorabilia for which we are deeply grateful. This is the purpose of the museum to preserve these items and we hope you will keep us in mind for such preservation. Should it be a letter or an article or a book which is not available to us as such, it may be possible that we may have it duplicated for our files. The museum is a membership organization and as such we have members from Maine to California to Texas. We want more members for the participating effort. We want members and friends to think of us as a legacy bequest. We deeply want to perpetuate this great organization and we want it endowed so that its future is assured.

"We are going forward with intense confidence in the future such a program will be developed and I know with your support, cooperation, efforts and thoughtfulness, that succeeding generations will be deeply grateful to you and your support of this worthwhile project. Our true and underlying purpose must always be to appreciate the things of the past in order to better accomplish the things of the future."

* * *

Mr. Morrell's address was to collectors of course, and he does not know that I'm

lifting out these quotes, in fact, I haven't time to get his express permission to do it, but they so closely parallel the cooperative effort as we've expounded it so often here, and they are so applicable to the entire clock repair trade, I cannot resist doing it. He knows my enthusiasm for all things clockwise and one cannot meet him without catching a spark of his enthusiasm for the Bristol Museum, therefore, I'm sure it will be okay.

They have four memberships: (1) $500.00 life membership, (2) 100.00 sustaining membership, (3) $25.00 five-year contributory membership, and (4) $5.00 annual membership. Contributions to the museum are deductible for federal income tax purposes. If you have some book, tool or clock you would like to register, write him direct at 100 Maple Street, Bristol, Conn. Membership may be sent to secretary S. Russell Mink at same address.

Comment on the Lebanon story last month has been good, so good, in fact, that Jan and I are planning a repeat. General Time Corporation is building a factory at Athens, Georgia. It is to be opened formally sometime this fall. Charles E. Sommers, Jr. (veep, Clock Manufacturers' Association) writes: "I will certainly see that you are advised when the dedication services will take place."

J. & J.

CLOCKWISE

Dear Mr. Coleman:

I have an early American clock made by Chauncey Jerome, Bristol, Connecticut; it is an 8-day brass clock. It was first repaired by Mr. D. Rittore, November 17, 1848; Mr. S. H. Smith, March, 1860; Mr. S. H. Smith, June 4, 1866; Mr. Towelson, July 1867; Mr. Andrew Clark, January 30, 1875; Mr. Elbert H. Lowsburg, April 18, 1882.

I would like to put this clock in running condition. Can you please tell me how to determine the size of the weights?

JOSEPH T. BANKOWSKI
144 Jefferson Street
Stamford, Connecticut

Dear Mr. Bankowski:

Weight on these old 8-day American clocks is not critical—they run in the general neighborhood of 9 pounds. Raymond S. Behrle, 4142 Deyo Avenue, Congress Park, Illinois, is casting and marketing weights for early American (and other) clocks. A line to him will bring you the weights you need.

J. E. C.

Dear Mr. Coleman:

I have read your Clockwise and Otherwise for several years now and, being sort of an amateur clock collector, I find it of great value in answering ever so many questions that arise as I pick up a clock here and there. I purchased a cast iron clock some time ago up near Buffalo, New York, which is near my home town. It is a cathedral type about twenty-four or more inches tall with eight-day brass movement. I would like to learn something of its age, etc. The label on the inside reads as follows: Harlem Inlaid Clock Works, 119 & 120 Sts., 3rd and 4th Aves., Office, 22 Maiden Lane. I fail to find anything listed in either Drepperd or Palmer's books regarding the above company. I also picked up a wood movement, tall shelf clock with a Peck & Hayden label, another label with E. Thorp, Upper Alton, Ill.

Was Mr. Thorp a dealer or a manufacturer? Would you consider a Peck & Hayden clock a fairly good one as to rarity? It is an eight-day weight.

I also found a Southern calendar clock in fairly good condition, but instead of having a full glass door like yours in Palmer's book, it has round glass in the door over time and calendar dials. Which is older?

I would also appreciate it very much if you would advise me on how to remove and install, or replace worn pallets in an exposed escape Ansonia movement. I would like to replace the worn steel pallets with ruby which I now have. Are they cemented in, and if so, how are they removed? Thanking you in advance for any information you may be able to offer.

THERON F. HORTON
4727 Plover Avenue
St. Louis 20, Missouri

Dear Mr. Horton:

Your first clock must be a contract clock. A number of marketing concerns with offices in the vicinity of Maiden Lane were in the business of purchasing clocks on contract in large numbers, and applying their own labels before selling them. We have no concise records of these dealers.

Peck & Hayden is listed by Drepperd as

FINE WATCH SPECIALS

Chronograph	Waterproof	Automatic Waterproof	Nurses' Waterproof
17J Chrome top/SB	17J Chrome top/SB	17J Chrome top/SB	17J Chrome top/SB
$16.00	$10.25	$15.50	$13.00
	In All Steel	In All Steel	Yellow top/SB
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148 North Third Street, St. Louis, Missouri, 1838 and 1839. Palmer says, "Peck, Hayden and Company, St. Louis, Missouri, about 1840." There was no such clock factory actually manufacturing clocks there. Evidently they were just big-time clock selling agents using their own label. The Mr. E. Thorp of Upper Alton, Illinois, must have been a retailer or sub-agent for them.

Many of these clocks were the Birge, Mallroy & Company eight-day, strap brass movements with Ives rolling pinions, and while they are not rare (quite a few in circulation) they seem to be desirable in antique circles.

The jeweled pallets in the Ansonia exposed (Brocot) escapement clocks were set in with shellac exactly like watchmakers set the roller jewel in a watch. The chances are the steel pallets now in your clock were driven in friction tight; those who substitute steel for the jewel make them and select a size large enough to drive in. Some few hesitate to alter the original hole and make their steel pallets same size and shellac them in. Close examination under glass will generally determine whether shellac was used and many times whether or not the hole had been appreciably enlarged. Hard flake shellac is used, and you simply warm the verge arm enough to melt the shellac, etc. If practical, refer to Ward L. Goodrich's "The Modern Clock" —it has a good chapter on these escapements with drawings showing the pallet angle, etc. Naturally, shellacked-in pallets are removed by warming the shellac.

J. E. C.

Dear Mr. Coleman:

Please advise me where I can buy verges for old eight-day upright pendulum striking spring clocks made by Ingraham, Sessions and Waterbury from twenty-five to sixty years ago. It seems that most jobbers of watchmakers' supplies do not carry these new. Also advise me of the name and address of wholesalers of Westclox watches and clocks.

W. L. LEDFORD

Crandall, Georgia

Dear Mr. Ledford:

Clock verges of the type you indicate have not been produced in 10 or 12 years, and your material house does not have them simply because they are not obtainable. Just as you indicate a number of

makers, there are also several sizes to each make, thus to carry a stock would call for quite an assortment. The demand as well as the margin of profit does not warrant a manufacturer tooling up to produce them.

Many clockmakers meet this need by making them from "scratch." The Young-Neal Company, Chamber of Commerce Building, Nashville 3, Tennessee, is marketing blank materials for making these verges—blanks to make three verges, $1.00 plus postage.

We believe that Ewing Brothers, 5 Plaza Way, S. W., Atlanta 2, Georgia, may be the Westclox dealer for your territory. Westclox Division, General Time Instruments Corporation, LaSalle, Illinois, is the correct factory address for this firm.

J. E. C.

Dear Mr. Coleman:

This is my third attempt to recontact you since my letter of inquiry appeared in the November issue of A.H.&J. about the age of the antique English chime clock. The first set of snapshots were sent directly to you, the second set through A.H.&J. in Denver. I am sending these pictures again direct to you by registered mail and special delivery in the hope that they will reach you. Am also enclosing a dollar-bill for return of photos, etc.

I sent this movement to Clock Manor to have an arbor and receiving pallet made for it, and upon its return I completely disassembled and overhauled it, and found a little additional information on the front plate of the movement under the dial. This was written free-hand, apparently with a steel scribe, as follows: "A. Ingraham, Clerkenwells, London. 16/4/89." With this additional data and with the aid of the snapshots, I hope you can identify its maker and age.

I also have an old English fusee watch about 21 lignes in size, 7 jewels, lever escapement, with the name "Rhodes/Kendal" appearing on the dial. Back of the movement is completely enclosed with a locking cover, extra large solid balance wheel, no screws, it is gold or gold-plated, and has hairspring under the wheel. The name "T. & E. Rhodes" appears on back of the movement along with the number 24054. Could you give me the age of this watch?

I have two Ansonia clocks I would like to know the approximate ages of. One is an 8-day swinging clock about 2 feet high, has the 3 small leaf springs for a pivot, and the figure holding the clock is a statue of the Roman goddess Diana. The other Ansonia is built like a small lantern —30-hour movement numerical clock. Brass case about 6 inches high and 3 inches in diameter with a glass cylinder enclosing two sets of celluloid leaves, the top set for the hour and the bottom set for the minutes which flip over like the leaves of a book, showing the time.

Will appreciate the above information, and in closing might add that I always turn first to Clockwise and Otherwise each time I receive a copy of A.H.&J.

CLIFFORD N. HARTHILL

Pine City, Washington

Dear Mr. Harthill:

If I may use the slogan of the currently popular news commentator, "Glad we could get together." First, I am returning your dollar; C. & O. never accepts money, checks, or postal money orders. Stamps, yes, and in cases of heavy clocks, etc., we do return them express charges collect. We are proud of the service we try to render and more so of the fact that it is without charge; thus the above rule is strictly adhered to.

The rain check on your English chime clock still holds good, although I am beginning to entertain grave fears. We have two inquiries out on it, and neither of them have been heard from to date. T. & E. Rhodes are not listed, and must have been merchants, and from your description you have a typical "Liverpool" watch as they are called here; in England they refer to them as "Ormskirk" watches.

Ormskirk is a town just about 11 miles from Liverpool. Malcolm Gardner gave us that term some time ago. He wrote that: "Watchmaking was established all around Ormskirk, Prescott, Preston, Chesterfield, and Frodsham districts of Lancashire, with casemakers and factories in Liverpool. They supplied the Irish market in the early 19th century, and the U. S. A. market right up until about 1880 when the evolution of automatic machinery killed the trade completely."

The idea I get of it is that it is comparable to our own American clockmaking industry of about the same time; business was really booming and everyone got into the act. An 1854 directory for Prescott lists chronometer makers as 17, file makers 25, watch and clockmakers 5 only, watch hand makers 14, watch balance makers 20, watch escapement makers 4, watch movement makers 120, watch pinion makers 31, watch tool makers 43, watch wheel makers 38, watch material makers 4, wire drawers 2. Now if we take this to be typical of those towns all around Liverpool, you can gain some idea not only of the tremendous number of watches turned out, but how many, many of them got out with only the names of the merchant and/or seller on them.

I am sending you for your files one of my photos, a typical Ormskirk movement by Robert Roskell. If you will send a pencil rubbing or an accurate sketch of the case hallmarks, we can give you that date.

The first American clock you ask about is the "Ever-Ready Plato Clock" and was advertised by The American Electric Novelty and Manufacturing Company, 304-314 Hudson Street, New York City, under that name. It was patented by Eugene Fitch, New York City, April 1902, April 1903, two patents, and again July 1903. It was first announced in The Keystone of February, 1904, and first advertised in that journal in the following March issue. The advertisement was changed in the October, 1905, issue to include four models. The retail prices were $6.00, $6.50, $7.00 and $8.00.

I have one of the $8.00 models for Jan's collection. It is roughly about an inch taller than the others by reason of three little feet and a dome top (no handle as were on most models); the celluloid leaves are a bright blue with white numerals; the movement is German, having been made and trade marked by Junghans. Evidently the aforementioned firm either made or contracted for the case and indicator, and bought the movements on contract. We've seen them with a definite American movement, not marked, but strongly resembling New Haven, with Ansonia movement, and with Junghans movement.

Your "Ball-Swing" clock dates from about the turn of the century. It is cata-

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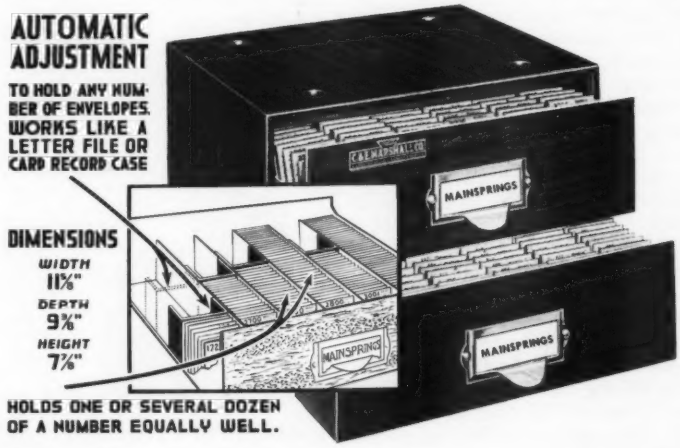

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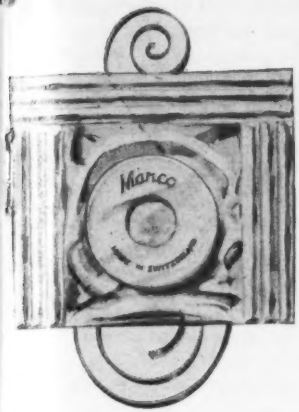

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logued in Ansonia's 1907 catalogue, page 34, as follows: "Ball-Swing clock, Diana, 30 inches high, $44.00" and shows a large picture of the clock. Pages 34 and 35 list six models, all similar. They range from 25 to 31 inches tall and are priced, list, $35.00 to $55.00. I note you say that the suspension on your clock has three springs. Originally it was four springs, two crossed at each end of the block. Possibly some repairman shifted one to the center when he found another broken. Stick by us on that rain check—we're still trying.

J. E. C.

Dear Mr. Coleman:

I read in the February issue on page 54 about an English fusee watch made by Jos. Johnson, Liverpool. I have a customer that has an English fusee watch, detached lever escapement, chain drive, with gold inlaid dial with diamond cap jewel, hairspring on underside of balance wheel and is marked as follows on movement and case: Jos. H. Johnstone, Liverpool, movement and case number 37135.

Could this have been made by the same man since the name is very similar? Could you give me some information on this matter and tell me the approximate age of this watch?

KERMIT L. THOMPSON
4854 MacCorkle Avenue
South Charleston, West Virginia

Dear Mr. Thompson:

Neither Baillie or Abbott list a Joseph H. Johnstone, Liverpool. The possibility that Jos. Johnson of Liverpool may have later thrown in a middle initial and changed the spelling of his name is most remote. I'd rather think it is a different man who was making an effort not to be confused with the other.

If you will send a pencil rubbing or a sketch of the hallmark in the case, we may determine the date for you. Meanwhile, we shall try to determine whether your Johnstone was a merchant or small maker who failed to get listed.

J. E. C.

Dear Mr. Coleman:

I am a reader of the A.H.&J. and am always interested in your section, as I am doing a lot of clock repairs. My object in writing at this time is concerning an antique steeple clock which I have for repair. The greatest difficulty in this job is the striking mechanism which has been removed, and the owner wants to restore.

Even if it cost quite a bit of money, I think she would have it done. However I would rather know about what such a job would cost before going into it. Last year I had a main time wheel made through Charles Terwilliger, and that cost $8.00, and when you consider a whole mechanism with no pattern to work from, it involves considerable work. I trust that you can give me some advice and information on the subject.

The information on the inside back of the case is as follows: "J. J. Beals & Company—Clock Establishment in Circular Building, Blackstone and Union Street, Haymarket Square, Boston." On the front plate is: "Brewester & Ingraham, Bristol, Ct., U.S.A."

The latter is probably the only useful information, and I am sending you a rough sketch, but can give you more details if required. Trusting to hear from you in the near future, and will appreciate any help you can give me.

L. W. JENNEY
67 Franklin Street
Port Jarvis, New York

Dear Mr. Jenney:

The Beals firms were extensive clock merchants. Brooks Palmer's list contains a half dozen of them covering from about 1838 through 1874. J. J. Beals Clock Establishment store in the Circular Building at the corner of Blackstone and Union Streets in Boston was advertising 22 types of clocks in 1847.

It is "J. J. Beals & Company" for 1848, 1850 and 1853, then for 1854 it is listed as "J. J. Beals & Son." Many clocks are known that have a Beals label pasted over the maker's label.

Brewester & Ingrahams are listed 1844 through 1852. Note the plural of that last name; the firm was Elisha Brewester, Elias Ingraham and Andrew Ingraham. From the above dates it would seem that the clock you have must have been made between 1848 and 1852.

Your front plate sketch is quite good. However, early American clocks were not consistently standardized enough for us to

supply the specific details you require. All those familiar with construction of about this period realize that far more irregularities show up in the strike than in the time trains. It is my thought that if one were privileged to compare a great number of Brewester & Ingrahams 30-hour movements, he might find several with this same front plate, and three or four different strike trains and arrangements of the strike train.

Any well-equipped, trained horologist ought to be able to take your old frame, and make and adapt thereto a satisfactory striking train. The point is it would require a considerable number of hours plus engineering, etc., winding up with a prohibitive figure as clock repairing goes. Now if your customer fully understands this, and is willing to lay out enough cash to compensate some horological mechanic for his time and shop for two or three days, don't tell her that it is an impossible job—just prohibitive. There are several shops over the country making a specialty of just this sort of work.

J. E. C.

Dear Mr. Coleman:

I am a young fellow just getting started in the clock repair business and I hope to be a watch repairman some day. A jeweler friend of mine introduced me to A.H.&J. for the first time, and I must say there is a great deal of information in your column Clockwise and Otherwise.

My problem is a Sessions electric mantel clock, model M, with the wiring in the motor winding broken. I have taken the clock to other repairmen, and have also written to the Sessions Clock Company at Forrestville, Connecticut, but have had no luck.

Perhaps with all your acquaintances in the clock repairing field you may know of someone who can help me with my problem. My customer likes the clock, and would like it repaired if possible. I would appreciate any information you can give me.

JACOB W. PRALL

817 Madison Street
Syracuse, New York

Dear Mr. Prall:

We appreciate your remarks a lot, and regret that we must report that our cur-

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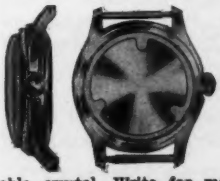

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rent Sessions file is rather low in information. For this reason, we do not readily identify "model M" or ascertain which motor it had.

I note what you say in regards to writing the manufacturer, and wish to call your attention to the Otherwise portion of this column. We have renewed our plea to the manufacturers through their Association in an effort to gain their cooperation thereby enabling us to assist just such cases as yours.

It is quite impractical for the average clockmaker to try to rewind a coil, besides new units are too cheap to waste the time. There should be in your town, a Sessions service station, most likely an electric dealer. Check the yellow pages of your phone directory, if no results, write the Empire Clock Company, 93 East Fifth Street, St. Paul 1, Minnesota.

J. E. C.

Dear Mr. Coleman:

A customer of mine has a mantel clock that stands about three feet high. It was made by the Birge, Peck & Company in Bristol Connecticut, is an extra 8-day rolling pinion, steel pivot brass clock. We could find no date on it.

Would you please tell me when it was made and any other information you might come across?

ROBERT E. ROY.

18 Union St.
Willimantic, Conn.

Dear Mr. Roy:

Birge, Peck & Company is listed as being in business from about 1849 to 1859; it was John Birge, Ambrose Peck, Samuel Taylor and William R. Richards. We believe he was christened Jonathan, but he is generally listed as John, and there is no question about him being one of the most colorful of the Connecticut clockmakers. He was the principal and moving spirit in about eight firms beside marketing clocks under his own name.

Birge & Hale about 1823; Birge & Ives 1832 and 1833; Birge, Case & Company 1833 and 1834; Birge & Fuller 1844-1848; Birge & Gilbert Company 1834-1837; Birge & Tuttle; Birge, Malroy & Company 1838-1843; Birge, Peck & Company 1849-1850.

J. E. C.

Dear Mr. Coleman:

Can you give any information about a German clock manufacturer of about fifty years ago by the following name: Gustav Becker. Any information would be appreciated.

BRADFORD W. CHENEY

183 Warner Avenue
Worcester 4, Massachusetts

Dear Mr. Cheney:

Gustav Becker of Frieburg, Germany, was born 1819 and died 1885, and had a sizeable clock factory with a large output of clocks and regulators.

This factory began to produce 400-day clocks about 1904, and were producing them twenty years later (1924). Somewhere along the line the Junghans Clock Company (Schramberg, Germany) seems to have taken over, the date is a little indefinite—we are not sure whether before or after World War II. Through my section of the U.S.A. we see several of the Becker 400-days, and a few Becker chimes.

Some of the latter are a fair quality movement—complete three train Westminster chimes in the orthodox manner, several of the two train type with the chime drum shifting back and allowing that train to strike the hour also.

J. E. C.

Dear Mr. Coleman:

I have an interesting watch that I would like to get some information on. Could you tell me who could do this for me? The watch is a key wind and set, has a large

balance covered by a filigree bridge, the escapement is of the rack and pinion type, I would say chain-drive.

The watch plate is engraved "Thos. Lawlor, No. 17812 London"; there are two sterling cases, one inside the other, and each has a marking on the back. I am sending you a sketch of the mark as closely as I can make it out.

There is a slip of paper in back of the outer case, and it has "Sylvanus Wilbour 1837" written on it, at least to the best of my knowledge.

S. H. COOPER

Aledo, Illinois

Dear Mr. Cooper:

Neither Baillie or Abbott list a single "Lawlor." Since the address is London, and the London list of makers is probably the most complete of all due to the "Clockmakers" Company being so active, it is safe to conclude that Thomas Lawlor was a merchant/jeweler who had his name engraved on the watches he sold.

Your sketch of the hallmark is good. The Lion Passant is the "sterling" fine mark for all English offices, the leopard's head, known as the "town mark," is for London, and the "K" on the shield is the "date mark" for 1805-6 (the date letter is changed annually at London May 29th). The "I.T." is the case maker's initials or mark—these were generally impressed by the maker before sending the article to the Hall.

J. E. C.

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THE WATCH REPAIRMAN AND THE OSCILLOSCOPE

By Carl H. Anderson

IN SOME of our previous articles when writing about adjusting watches we have mentioned the "Recovery" and "Resuming" rates. Out of all the hundreds and hundreds of letters we have received from our readers, who have written in about adjusting watches, not one of them has mentioned these two rates. This seems very odd to us as these rates are of greater importance in how the watch actually runs for the customer than the position, isochronous or temperature rates. Could it be that here are two rates of a watch with which the watch repairman is not as fully acquainted as he should be, or is it that many think these rates aren't important or that they are something mysterious and not understood the same as they have believed about the isochronous rates?

Let us see just how important the resuming rate actually is. Those of you who are employed in stores where they sell Grades 1, 2 and 3 Swiss watches, know that such watches come with Official Bulletins or Certificates showing exactly what the individual watch actually did when it underwent the official test. The Observatories at Neuchatel, Geneva, Besancon (France) and Kew-Teddington (England) issue Certificates and the "Bureaux Officiels de Controle de la Marche des Montres" issue Bulletins. There is a considerable difference between the tests of the Observatories and the Bureaux. The Observatory tests are very rigorous and are held to extremely close tolerances. These tests are for a 44-day period and are the same identical tests given a Marine Chronometer. For the first five days the watch is run in the crown left position at a temperature of 66° F. The second five days in the crown up position at 66° F. The third five days in the crown down position at 66° F. On the sixteenth day it is run at a temperature of 45° F. The next five days the watch is run in the dial up position at 37° F. Then an intermediate day at 66° F. The next five days in the dial up position at 66° F. This is followed by an intermediate day at 84° F., then five days in the dial up position at 95° F. This is followed by an intermediate day at 66° F., after which the watch is run in the dial down position at 66° F., for five days. The final five days is in the crown left position at 66° F. This makes a total of 44 days.

During the entire 44-day period the watch is not set, but the record of the time is taken each day. For example, at the beginning on one 24-hour period let us say the watch is 10 seconds fast. At the beginning of the next 24-hour period the watch is 12 seconds fast. Therefore the watch gained two seconds during this 24-hour period. That is the way the record of the watch is kept.

There is considerable difference in the tolerances allowed in the Observatories and Bureaux tests, the former being much more stringent. The Bureaux tests are only for a period of 15 days, the watch being changed in position each second day. The first day in any of the positions is not counted in the official rating as the watch has been disturbed by having been moved from one position to another. This off-the-record day is allowed for the watch to resume its normal running rate in each particular position.

We are indeed sorry we can not give you the actual record of any watch which has passed the Observatory Test at any one of the four officially recognized Observatories, viz: Neuchatel, Geneva, Besan-

Mr. Anderson will be glad to answer any question pertaining to the Oscilloscope. Queries should be sent to him in care of the American Horologist & Jeweler, with a stamped return envelope enclosed.

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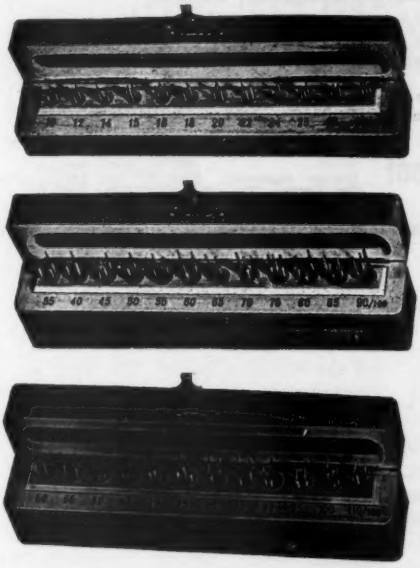

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con or Kew-Teddington. A watch which has passed the test of any of these Observatories is generally recognized as a Grade 1 watch, since these tests are the most severe given watches anywhere in the world. In all of our 45 years at the bench we have never seen or worked on a Grade 1 watch that we are aware of. Such watches are few and far between and as we understand it are usually retained by the factory which made them as museum pieces as such factories generally only make a very few such watches each year. For each of the categories only *four* watches are required to be submitted. You can readily understand from this that either you or we would not have very much of an opportunity to ever see or work on such watches.

So that you may better understand the different catagories, "A" is for Marine Chronometers for use aboard ship, therefore no watches can be entered in this catagory. "B" is for Board Chronometers which are also used aboard ship. "C" is for Pocket Chronometers and these would be the same as large sized pocket watches. "D" is for what we usually call a wrist watch. The official dimensions for the different catagories are as follows: "A" larger than 43 mm. in diameter; "B" from 38 mm. to 43 mm. in diameter, both inclusive; "C" for from 30 mm. to 38 mm. in diameter, both inclusive and "D" is for watches not larger than 33 mm. in diameter, the majority being gentlemen's wrist watches 30 mm. in diameter.

We have just received the official figures for the 1953 Observatory tests. At the Neuchatel Observatory in Category "A" there were 22 certificates granted, all to the same manufacturer. In Category "B" there were 45 certificates granted to 13 different manufacturers. In Category "C" there were 49 certificates granted to 14 different manufacturers. In Category "D" there were 42 certificates granted to 5 different manufacturers.

At the Geneva Observatory the number of watches submitted for the tests were: Category "A", 49; Category "B", 13; Category "C", 23 and Category "D", 77, making a total of 162 in all. Of this

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number 139 passed the tests and received certificates. Of the 77 watches submitted in Category "D" only 53 of them passed the tests and received certificates, leaving 24 which did not pass, or approximately 1/3.

Why have we mentioned all this? To show you how many Grade 1 watches are actually made each year. Add together the 42 Category "D" certificates granted at Neuchatel and the 53 Category "D" certificates granted at Geneva and you have a grand total of only 95 Grade 1 watches officially passed by these two Observatories for the entire year of 1953. If only 95 such watches were made in a year, what chance do you think you or we will ever have of ever seeing or working on such a watch? (If you are interested in the formula by which these watches were rated, here it is: $N=60-F(40E+10P+100E+2F+2R)$. N is the final numerical rating given. E=mean variation of daily rate; P=mean variation corresponding to a change in position; E=primary error of compensation; F=secondary error of compensation; R=recovery rate and F= coefficient of difficulty connected with the category being tested.) At the Geneva Observatory the highest rate obtained in Category "D" was 50.92, using the forgoing formula for the calculation.

The official figures for the five Bureaux for the year 1953 have not as yet been released. The number of watches tested at the five Bureaux for the preceeding four years are as follows: 1949—26,229; 1950—29,116; 1951—33,968 and for 1952—50,377. One item of particular importance in these tests is that in 1951 one company received more than 75% of all the Bulletins issued, and in 1952 this same company received over 60% of all the Bulletins issued. The drop in percentage was caused by another company submitting watches for test in larger quantities (over 3,000) in 1952 than they had in any preceding years (about 100 each year).

There are two classes of Bulletins issued by the Bureaux. The top ones are for watches which achieve "especially good results". They have attached to them a small certificate which states: "Resultats particullerement bons", or in French: "avec mention". To obtain this higher grade Bulletin the watch must have shown a much better rate than the required minimum. Those watches marked "especially good results" are generally known as Grade 2, since they were not submitted for the much more severe Observatory tests. Grade 3 are those which received a Bulletin for at least the required minimum.

* * *

Let us now examine two actual Bulletins and see just what rates these watches actually achieved. Remember the watch is tested for 15 days and it is not re-set during this time. The variation in seconds is noted each day and the difference between the two succeeding days being taken as the rate of the watch. Both of these watches were tested at the Bienne (Switzerland) Bureau and the following figures are taken from the respective Bulletin which accompanied each of these watches. (See chart p. 53.)

Here we have the actual case histories of

DAY	WATCH "A" BULLETIN #968,382 DAILY RATE	VARIATION OF THE DAILY RATE	WATCH "B" BULLETIN #200,246 DAILY RATE	VARIATION OF THE DAILY RATE	POSITION OF THE WATCH
1	+ 6		+11		Vertical, Crown Left
2	+ 9	3	+10	1	Vertical, Crown Left
3	—14		+11		Vertical, Crown Up
4	—12	2	+12	1	Vertical, Crown Up
5	0		+ 6		Vertical, Crown Down
6	0	0	+ 2	4	Vertical, Crown Down
7	+16		+18		Horizontal, Dial Down
8	+16	0	+17	1	Horizontal, Dial Down
9	+18		+13		Horizontal, Dial Up
10	+17	1	+10	3	Horizontal, Dial Up
11	+20		+30		Horizontal, Dial Up, 40° F.
12	+19		+17		Horizontal, Dial Up, 65° F.
13	+22		+21		Horizontal, Dial Up, 90° F.
14	+ 9		+ 4		Vertical, Crown Left, 65° F.
15	+ 8		+ 8		Vertical, Crown Left, 65° F.

(Where temperatures are not shown the watch was tested at room temperature, which was kept as near 65° F., as possible.)

Now for the summary of these two watches:

	WATCH "A"	WATCH "B"
Mean Daily Rate in the Different Positions	+ 5.6	+11.0
Mean Variation	± 1.2	± 2.0
Maximum Variation	3.0	4.0
Greatest Difference Between Mean Daily Rate and Any Individual Rate	19.6	9.0
Variation of Rate per 1° Centigrade	— 0.07	— 0.30
Rate Resuming	+ 0.5	— 2.5

two watches which received Bulletins at the Bienne Bureau. Go back over them very carefully and see if you can determine which Bulletin was marked "Especially good results" and which one was not so marked. Notice particularly that these Bulletins give the "Rate Resuming", so this rate is taken into account in determining the actual time-keeping of the watch in question. Watch "A" has a 3-second rate in one position, a 2-second rate in another position, a 1-second rate in still another and a 0-rate in two positions. Would you say that is good? Yes, it certainly is. Watch "B" has one 4-second rate, one 3-second rate and three 1-second rates. Adding the seconds rate of Watch "A" the total is 6 and the total for Watch "B" is 10. Carefully compare each different individual rate. Notice particularly that Watch "A" has by far the better rates in every particular save one. Watch "A" in the "Greatest difference between mean daily rate and any individual rate" is 19.6 seconds, whereas for Watch "B" it is 9.0 seconds. The greatest variation from actual time for Watch "A" was —14 seconds and +22 seconds, or a total of 36 seconds from the fastest to the slowest time. The same differences for Watch "B" were +2 and +30 seconds, or a difference of only 28 seconds.

One of these watches received a Bulletin marked "Especially good results" and the other one did not. Which do you think is which? Was it "A" or "B"? Why? Go back over the rates studying them very carefully and see if you arrive at the same decision as that of the Bureaux. Just looking at the 5-position rates one would naturally say Watch "A" would keep the better time, but is that correct? The greatest position error of Watch "A" was 3 seconds while for Watch "B" it was 4 seconds in one of the positions in which a wrist watch usually finds itself. As you fully realize, wrist watches are seldom in the crown left position, while when being worn they spend many hours a day in the crown down position.

If you are adjusting watches to the usual five positions you would naturally

say Watch "A" has the better rate and that is true for the five position rates. But —you must remember, whether it be a pocket or wrist watch, it is being worn and is being jostled about for approximately 16 hours out of every 24. What effect does this jostling have on the time-keeping of the watch? The figures are in the table for both watches.

We know plenty of watch repairmen (including ourselves) who would be perfectly satisfied with a wrist watch which showed the position rates of either of these watches, but that still doesn't tell how the watch will run while being worn. Sure, most repairmen are lucky and without even knowing they did it or how it was done, they secure pretty good resuming and recovery rates for their watches, else they would not keep satisfactory time for their customers.

We have brought all this up to show you the high importance of the resuming and recovery rates. While these Bulletins do not give the average of the recovery rates, nevertheless these rates are in the charts and can be obtained easily by a little addition and subtraction. Notice though that these Bulletins do give the resuming rates, Watch "A" having a resuming rate of +0.5 second and Watch "B" —2.5 seconds. In this particular rating, Watch "A" has by far the better rate, there being a difference of 3 full seconds between the two.

* * *

Now go back over all the rates very carefully once again and see which watch lost the "Especially good results" notation on its Bulletin and where it was lost. We own both watches and readily admit both of them keep very excellent time, time that most any watch repairman or owner would be highly satisfied with. In fact neither one of them has been set since last September and one of them was +4 seconds this morning when compared with the "WWV" time signals and the other one was +2 seconds. Occasionally either one of them will be off as much as + or — five seconds, but that never bothers us as we know this error to be mostly barometric pressure and humidity and how the heck are we going to correct these rates in any kind of watch which is being worn?

Have you made up your mind as to which one of the two watches is the better? One of the watches bears the name of a very famous manufacturer who only makes Grade 1, 2 and 3 watches, while the other bears the name of a manufacturer who submits possibly a dozen watches a year to the Bureaux (and none to the Observatories) and whose production is almost entirely Grades 5 and 6. If you haven't already determined which watch is the better, Watch "B" received the Bulletin marked "Especially good results". Where did Watch "A" fall down and not receive the better of the two Bulletins? Go back and look at "Greatest difference between mean daily rate and any individual rate". Notice Watch "A" is given 19.6 seconds and Watch "B" 9.0 seconds. The official ratings required by the Bureaux in this classification is ± 16 seconds for a Bulletin with "Especially good results" and ± 26 seconds for a Bulletin without such endorsement. What caused this difference in rates? Please note that the watch is changed in position. The first day the watch is wound and set and placed in the crown left position. At the end of 24 hours the watch is rewound, the time being noted, and the watch returned to the same position. The rate of running time the first day in any position is not counted as the watch is allowed 24 hours to settle down in that particular position.

Then the official rate is the time for the second 24 hours in that same position. So let us see what actually happened. At the end of the first 24 hours Watch "A" was 6 seconds fast which was caused by the watch being disturbed during its handling, whereas during the second 24 hours the watch was running at its natural rate in that position. At the end of the second 24 hours the watch was 9 seconds fast. Since it was 6 seconds fast at the beginning of this period and was 9 seconds fast at the end of the period, the watch actually gained only 3 seconds during the period (or the second 24 hours). Then the watch was changed to the crown up position, and at the end of the third 24 hour period the watch was 14

seconds slow.

Since it was 9 seconds fast at the beginning of the period and 14 seconds slow at the end of the period, the watch actually lost 23 seconds in the period. Such periods are not counted however in determining the individual position rates due to the disturbance of the watch in changing the positions. Then at the end of the next 24 hours (the 4th day) the watch was only 12 seconds slow, thus it gained 2 seconds in that period. You can easily determine from a study of the charts that only the second 24 hour period in any one position is the one which is counted toward position ratings. You could not obtain the actual rate of the watch if you moved its position every 24 hours and counted every period.

Now, if you think the resuming rate is of little or no importance, just why do the four Observatories and the 5 Bureaux include this rate in their Official Certificates and Bulletins?

Select a good watch and make this test with it. Wind and set it, noting down the exact seconds. Place it in any position, then at the end of 24 hours compare the watch and put down the exact second, either fast or slow. The difference between the two readings is how the watch ran during the 24 hour period. Now very carefully wind the watch and place it back in the same position for the next 24 hours. Pick up the watch every carefully, wind as carefully as possible and put it back down just as carefully. The idea being to jostle the watch the least possible amount so as not to disturb the balance arc. At the end of the next 24 hours again take the rate.

Let us use a hypothetical case. The watch is set to the second, which we will call 0 seconds; 24 hours later take the rate of the watch before disturbing it. Let us say it is 3 seconds fast. Now very carefully wind the watch and put it back in the same position. At the end of the second 24 hours again take the rate of the watch before disturbing it. Let us say it is 4 seconds fast, so the watch actually gained 1 second in the second 24-hour period which is the actual rate of the watch for that period. If you doubt it, run it another 24 hours in the same position and

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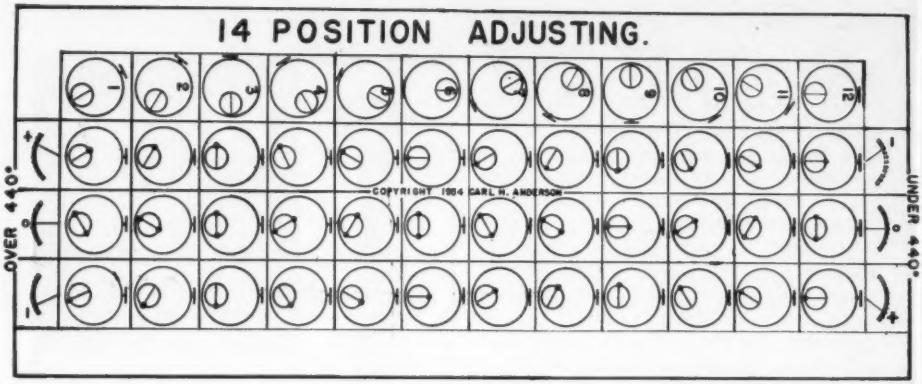

you should have another 1-second gain. You see it just simply isn't possible even in the very finest watches to wind a watch and put it in another position and have it keep the same exact time. You must allow 24 hours for the watch to settle down in the new position before trying to take the rate.

Why explain all this? Because practically every watch repairman repairs his watches, winds them full up and puts them under the microphone in the timing machine. What kind of a rate does he get? He gets the correct rate of the watch at that exact period of time. Will the watch keep the same time in his customer's pocket or on his wrist? *It definitely will not.* That is one of the reasons why you get a different running rate of the watch when the customer wears it than it showed on your timing machine. Should the rate of the watch be taken immediately after the watch has been repaired? *Definitely not.* The watch should be allowed to run for at least three or four days before trying to determine what the final rate of the watch will be. Yes, you should go through your usual adjusting procedure immediately after completing repairs to the watch and bring it to a good, close rate. Then three or four days later put the watch on the timing machine and again note what the changes have been. This is the time to complete your final adjustments and not before.

Later on we will publish some oscillograms and timing machine charts of some really good watches which were made immediately after completing repairs and also at the end of 3 or 4 days. You will notice there is quite a difference in both the timing machine charts and the oscillograms. It all depends on what kind of a job you wish to turn out.

* * *

Last month we published the first of our charts. This month we are giving you the one we call "14 Position Adjusting". By looking at the chart you will notice only the 12 vertical positions are shown, it being assumed you know that the dial up and dial down constitute the other 2 positions, making 14 in all.

There are many who say if you are going to do 14-position adjusting that you are also accomplishing Dynamic Poise at the same time. With this statement we quite agree.

We believe it is not possible to do a good job of 14-position adjusting without at the same time doing a good job of Dynamic Poising. In fact the two are so closely interwoven that it is impossible to do one without to a certain extent doing the other. Perhaps we have our charts incorrectly named and this one should be called "Dynamic Poising", because to accomplish 14-position adjusting and dynamic poising you not only have the balance wheel in practically perfect poise, but you also have the dynamic errors of the hairspring corrected. To accomplish either or both of these adjustments, it is necessary that the hairspring be as nearly perfectly centered as is possible, that it is flat, level and breathes evenly all around and that the balance be evenly weighted all-around. In this type of adjusting you overcome the out-of-poise condition of the

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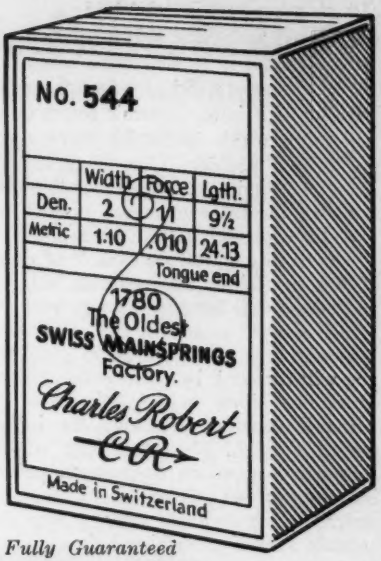

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There are those who do not believe in introducing an error to overcome another error and we belong to that group. We believe in removing the error in the first place instead of overcoming it by putting in an error at some other point. But in this particular type of adjusting and poising it isn't possible every now and then to keep from putting in a very slight error in some particular position to overcome an error in another position. When this is done however, you should end up with a practically perfect rate all-around. Any sag error in the hairspring or out-of-flat-or-round condition of the hairspring can easily be overcome by using our charts. But be careful what you do so that you do not end up with an error which hits you in the face with an awful slap in some other position.

We will not attempt to give instructions on the use of this chart in this month's article, because you will have to have the chart on Dynamic Poising (which will be published next month) before you can achieve the results which are possible or which you may want. We have tried to simplify our charts just as much as humanly possible, keeping in mind that some of our readers know far more about this than we do, while others know very little of the subject.

We have indicated the crown in each of the positions, as well as the position of the arm of the balance when it is at rest. For example, we have arbitrarily placed the balance in the position usually occupied by the figure 6 on the dial, although in most watches the balance is actually closer to either 5 or 7 o'clock.

First you must determine the total balance arc, whether or not it is over or under 440°. If it is under 440° you turn the chart so that end is at the top. If the total balance arc is over 440° you turn that end to the top. On one side you will find a — mark which indicates the watch is running slow in that position, while the + mark indicates it is running fast in that position. The heavy round dot on the periphery of the balance marks the heavy spot of the balance.

One of the hardest things to do in this type of work is to determine whether it is the balance which is slightly out-of-poise or if it is the dynamic forces of the hairspring which is causing the error in any certain position. Quite naturally you must first attain the nearest possible static poise of the balance on the poising tool and likewise as perfect development of the hairspring as you are capable of doing. If you have done this properly, you will find there will be only a very, very few seconds error in any of the 12 vertical positions. The error will be so small that you will correct it by making the necessary alterations either to the balance or the hairspring without removing the balance from the watch. We will publish later on complete instructions on how to poise a balance without removing it from the watch, which requires only a very few seconds work if everything beforehand has been properly done.

Now don't jump at conclusions and say here is a panacea for all my ills, for it isn't. This type of adjusting is only for the watch which is capable of receiving such adjustments. Take the usual commercial grade watches for example, you are very foolish if you even attempt to carry out this type of adjusting on such watches. They weren't made that way in the first place and most certainly you are not going to entirely remake the whole watch. We sincerely believe in making each and every watch run at the very best possible rate, consistent with what can be done at a profit. To take a cheap, commercial, 17-jewel ladies' watch and try to make a railroad grade or chronometer out of it is foolhardy. If you are really going to do this, you will find you will have to put in a lot of new parts as the ones now in the watch aren't capable of taking and retaining such adjustments. The hairspring may be of the wrong type, it may have the wrong number of coils, the collet pinning at the wrong point, it may be too stiff or too limber, the overcoil may not be the correct shape and a hundred and one other things. So we say, bring the watch to the best rate possible consistent with what will satisfy the customer. If it was a high grade watch in the first place with a Bureau Bulletin, then by all means restore it to that condition, but if it was just a "run of the mill" to begin with, then bring it to reasonable rates and your customer will be well pleased.

There is still another angle and that is, how much can you afford to do to a watch for the repair charge you receive? We charge $8.50 for the usual "run of the mill" overhaul job. For that we do give the watch (regardless of quality) an acceptable 4-position rate. For a Rolex, or comparable grade, we charge $22.50 for an overhaul job, but it goes out with a very close 6-position rate, not over 2 or 3 seconds between any two positions. Why this difference? Because the watch is capable of taking such adjustments in the first place.

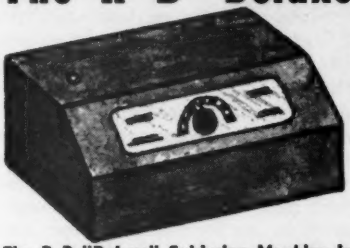
We will have more to tell you next month when we publish the Dynamic Poise chart.

* * *

We were greatly amused the other day when a salesman came in and very proudly displayed a dozen-bottle cabinet which contained balance staffs of different measurements for the same watch. For example, it had staffs of three different measurements for AS 976. We wonder how many of you realize how many watches of the same make and calibre use different measurement staffs? Let us use AS 976 as an example. We have *nine* different measurements for staffs for this watch and *every one of them is absolutely correct.* It is true however that most AS 976's use one of two different staffs, the difference being in the collet seat measurement, but different finishers have used staffs of other measurement and when you try to fit one of the staffs you have in stock to one of these watches, you find it simply doesn't fit. For example, a watch equipped with Incabloc jewels usually takes a staff longer in overall measurement than a regularly jeweled one. Take AS 970 for example, most of these watches with regular friction jeweling take a staff with 2.85 overall measurement, but if it is fitted with Incabloc jeweling, it usually takes a 2.95 overall measurement.

Have you had the experience of using

The R B "Deluxe" Soldering Machine



The R B "Deluxe" Soldering Machine is especially suited to the optical and dental trade as well as the manufacturing jeweler and watchmaker. The soldering machine can handle the most delicate as well as the most difficult soldering jobs with ease. With the dial control, you need only dial to the required heat.

The case is made of heavy sheet steel with a grey, baked enamel finish.

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CHECK THESE ADVANTAGES:

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The foot control turns the soldering machine on and off. Your hands are free to handle the soldering carbons and the items being soldered. The dial control on the machine adjusts the current for the correct degree of heat required.

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A new feature of this soldering machine is a built in demagnetizer powerful enough to demagnetize all small hand tools or watch parts Simply place the magnetized object next to the black circle on the side of the machine, turn the machine on and draw the object away from the machine.

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staffs out of your regular AS 970 bottle and found they fit perfectly all around in some watches, but when you tried to fit this same staff to an AS 970 with Incabloc jeweling you found the collet, balance and roller fit perfectly, but the staff was too short, in fact, it would actually fall out of one of the hole jewels when the watch was in either of the dial positions? Then there is another very major and highly important difference in a staff for an Incabloc jeweled watch. The regular staff does not have a square shoulder on each of the cone pivot ends, while the Incabloc staff does have such square shoulders. The purpose of this shoulder is to come into contact with the raised ring on the oil cup side of the Incabloc hole jewel when the watch is bumped. This stops the end of the balance pivot from coming into contact with the cap jewel because the square shoulder comes into contact with the raised ring first and thereby lifts the entire jewel assembly out of place. The lyre-shaped spring forces the jewel assembly back in place after the shock due to the cone cut on the hole jewel setting and the cone in the plate. Many AS 976's are now coming through with Incabloc jeweling and they take a longer staff than the regular friction jeweling.

We keep in a file right by the side of our bench every material catalog we have ever been able to get our hands on, including catalogs from England, France, Switzerland, Germany, Italy, etc. Why do we have these? Because many of the GIs who returned from overseas brought back with them watches which are not listed in our usual material catalogs. In all, we have the data on over 6,000 different Swiss calibres, to say nothing of the English, French, German, Japanese and others. We have been able to repair these watches when others failed because they could not properly identify the calibre or could not locate the correct part.

We have the measurements of over 7,000 different Swiss balance staffs, and over 5,000 Swiss stems. How do we use them? Easy. Someone brings us a watch which they have been unable to get repaired elsewhere. You look all through your usual material catalogs and you can not find either the make or the calibre. So, you think you are stumped because

there isn't a mark of any description anyplace on the watch or dial. Before we can find a staff for the watch we must know both the make and the calibre, so we go hunting through our foreign material catalogs. Did you ever hear of these names: Mirax, Vigilant, Thiel, Orion, La Champagne, Crettiez, Tempora, Durove, Berger, Epple, Hanhart, Urofa, Amica or Sam? No, they aren't just dial or plate names, they are the names of actual watch manufacturers. And there are more than a hundred others which we have not mentioned.

Sure, you have seen all kinds of names on the dials and plates of standard Ebauches, but this particular watch didn't happen to be an Ebauche. So first, we determine the ligne size and the shape of the movement. With this determined, we start in with "Les Principaux Calibres des Montres identifies par leur plaque de remontoir." Before going through many pages we find it to be a calibre 247 Crettiez. Now we know the make and calibre, so next we must know the number of the staff. This is very easily found in one of our staff measurement catalogs. We look through the alphabetical listing of manufacturers and find Crettiez, then we run down the calibre list until we find our calibre number and opposite that we find the staff number. Let us say for example, the staff is #3,483. Then we look in our staff cabinet for staff #3,483 and find we do not have it. Next we go to the numerical list of staff measurements and we find the measurements to be 2.86 overall length; 1.47 height from the end of the bottom pivot to the bottom of the balance seat shoulder; 0.96 balance seat diameter, 0.51 collet seat diameter and 0.29 roller seat diameter.

Next we go to the staff measurement chart where all staffs are listed according to their measurements from the shortest to the longest. Down the list to overall length 2.86, then we locate the other measurements for this length. Since we know the correct measurements of the staff we must have, then the next thing is to find just which staff we have in stock that will most closely meet those measurements. First we look over all the staffs of 2.86 length and we find one correct in all measurements except the height from the end of the bottom pivot to the bottom of the balance seat shoulder. This staff measures 1.35 which means if we tried to use this staff, the underside of the balance arms would in all probability rub the top of the pallet bridge.

Going on down the list, we finally find one with an overall length of 2.87, balance seat height 1.47; balance seat diameter 0.98, collet seat 0.54 and roller seat 0.30. What does this mean: the staff is 1/100 mm. too long but this can very easily be taken care of by bumping the cock plate. (Never cut burrs in either the pillar or cock plates to change the balance end shake, always bump the cock plate.) The height of the balance seat is correct, so no alteration is required here. The balance seat diameter is 2/100 mm. large, the collet seat 3/100 large and the roller seat 1/100 mm. large. These very slight alterations are very quickly and easily made, so we now have a staff of the correct measurements to fit a watch no one in the U. S. A., has ever heard of.

* * *

How do you keep your stock of staffs and stems? By caliber numbers? If you do it is possible to have the *same identical staff in not less than 25 different bottles.* Needless duplication wouldn't you say? The same thing holds true for stems. Certainly you keep your mainsprings by measurement, do you not? If it is the correct system for mainsprings, why isn't it equally correct for staffs and stems? Surely you do not keep mainsprings by dial names and have the same mainspring under a dozen or more different brand names. Take an FF 120 for example. How

CORRECTION

A printer's error appeared in the Adjusting Chart, page 56, June, 1954 issue. Counting the top word "Adjusting" as the first line, lines 5 and 6 read . . . "To Change PPS Only: At PU level hpsg to 10 seconds or less. If PU— lift up to + to + rate." These lines should have read . . . "To Change DPS Only: DPS + compared to PU, push out on overcoil to — rate, in to + rate."

The correct lines are set below in the same type size and width used in the original chart. The reader may cut out the two lines and paste them over the incorrect lines 5 and 6 on the Chart.

TO CHANGE DPS ONLY: DPS + compared to PU, push out on overcoil to — rate, in to + rate.

many names have you seen on this one? Don't they all take the same measurement mainspring regardless of the name on the dial or plates? Wouldn't the same thing hold true for the staff and stem? Before long we will give the measurements of some popular staffs and stems and likewise the list of calibers they fit. Take an AS 970 fourth wheel and pinion. Just how many different calibers do you think it fits?

We say keep your staffs and stems as well as your mainsprings by their numbers, then for the same investment you can carry a much larger variety because you will not have duplication.

If you do not have a staff measurement chart, you will find a very useful one in the new Newall Catalog which is now available from your Material Dealer. This new edition gives the measurements for more than 700 different Swiss staffs, as well as a lot of other information you will find highly valuable. If you haven't as yet received a copy, ask your Material Dealer to send you one. With this for a starter perhaps you will be able later on to pick up other measurement charts and ultimately you will have quite a file of measurements.

Coming Conventions, 1954

July 18-19—Mississippi Retail Jewelers Association, Buena Vista Hotel, Biloxi, Miss.

July 18-21—Southern Jewelry Show, Dinkler Plaza, Henry Grady and Piedmont Hotels, Atlanta, Ga.

July 25-29—National Jewelry Fair, The Conrad Hilton, Chicago, Ill.

August 8-12—ANRJA Annual Convention and Trade Show, Waldorf-Astoria Hotel, New York City, New York.

September 4, 5, 6—United Horological Association of America Annual Convention, Jung Hotel, New Orleans, Louisiana.

September 5-7 Ohio RJA, Netherland Plaza hotel, Cincinnati.

September 12—Retail Jewelers Association of Missouri, Inc., Annual Convention, Governor Hotel, Jefferson City, Missouri.

September 12, 13, 14—Minnesota Retail Jewelers Association Golden Anniversary Convention and the Eighth Annual Jewelry Trade Show, Nicollet Hotel, Minneapolis, Minnesota.

September 19, 20—Iowa Retail Jewelers Association Annual Convention, Hotel Fort Des Moines, Des Moines, Iowa.

September 19-20 Michigan RJA, Hotel Hayes, Jackson. Exec. Sec.: F. E. Foldey, 1504 Olds Tower building, Lansing.

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W. M. D. A. CONVENTION

AN ALL-TIME high attendance, re-election of the complete officer slate, and the adoption of a universal catalog were the highlights of the Eighth Annual Meeting of the Watch Material Distributors Association of America, held June 7 and 8 at the LaSalle Hotel, Chicago.

The Association's catalog project, guided by technical advisor Henry Fried, was discussed by the entire membership present and was approved by unanimous vote, with only minor changes. It was proposed for consideration that the catalog carry a separate section for each of the advertised brands, and sample copies sent to all the members for final voting.

The convention adopted resolutions favoring the elimination of the excise tax and commending the Jewelry Industry Council for its efforts in this matter, and a sincere vote of thanks to the Watchmakers of Switzerland Information Center and Ebauches S. A. for their efforts on behalf of the watch material trade and servicing of watches.

Committee Reports Summarized

Standardization

Harry Furry, of Burton M. Reid Sons, Inc., presented a well-received analysis of the problem of standardization of material assortment both for jobbers and watchmakers. As a result, a committee was appointed to look into the potential of standardizing any future assortments that will be sold by importers, manufacturers and jobbers.

Consumable Supplies

Charles Braum, of E. & J. Swigart, Cincinnati, Ohio, presented an interesting plan with respect to various trade printed items such as envelopes, stationery, etc., the nature of which will be circularized to the membership and which gives promise of effecting sizable savings in printing costs and consumable supplies to members.

Mainspring Envelopes

Harry Nest, of Detroit, Michigan, announced that Elgin has definitely begun to produce a standard envelope that will correspond to other envelopes in use by other manufacturers and importers. William Rice, material manager of the Elgin firm, who was present at the meetings, confirmed this welcome news.

Product Research

Jack Gould of Dallas, Texas, discussed many subjects of interest in the field of product research, particularly that of packaging. Mr. Gould stressed the point that, for example, by packaging cylinder crystals in units of three, larger volume sales should result because of the natural inclination on the part of a buyer to accept the "package."

Membership

J. Speed Reid, of Burton M. Reid Sons, Inc., Springfield, reported on the growth of the Association in both Active and Associate members. A net gain of five memberships was noted with satisfaction by the applause which greeted the introduction of various company representatives.

Financial

Jim Trader, of E. & J. Swigart, Pittsburgh, WMDA treasurer, presented the findings of a Certified Public Accountant's report to the effect that the Association's treasury is at an all-time high. Members are invited to write the Executive Director for information concerning Association finances at any time.

EUGENE J. SOBEL
President of W.M.D.A., re-elected to office with entire officer slate

Convention Panel Summaries

Unbreakable Mainsprings

Moderator: Sydney W. Prague, Prague-Kurtz Company, Houston, Tex.

Panel: Robert C. Hofmann, Sandsteel Spring Division, New York, N. Y.; James Swartchild, Swartchild & Co., Inc., Chicago, Ill.; Edward Renz, Hammel, Riglander & Co., Inc., New York, N. Y.; C. E. Hendrix, Hamilton Watch Co., Lancaster, Pa.

1. Even so-called "unbreakable" mainsprings can break if improperly handled.
2. The fact that a spring is "alloy" doesn't mean it's unbreakable.
3. Watchmaker should ask for spring size based on *steel* dimensions—even though he may find (upon miking) that the alloy spring is

Traditional banquet concluded Convention's gala social events

slightly different from the steel.

4. Jobbers are cautioned that not all white springs are unbreakable.

Jewelry and Attachments

Moderator: Edward Schliefstein, Advance Watch and Jewelers Supply Co., Washington, D. C.

Panel: Bernard Kanter, Jacoby-Bender, Inc., New York, N. Y.; Harry Haselton, Haselton Co., Boston, Mass.; Wally Miller, Miller Bros. Watch Strap Manufacturing Co., Cincinnati, Ohio.

The panel agreed that watch attachments are one of the most important items in the distribution picture because the material jobber is closer to the retailer and to the repair desk where sales are being made. Panel members made the point that the material jobber is the natural source of supply for jewelry attachments. Effort should be made, however, to exchange or merchandise slow-selling numbers in the retailer's stocks.

Watch Crystals

Moderator: Harry Furry, Burton M. Reid Sons, Inc., Springfield, Ill.

Panel: Jerome Shiffman, Standard Unbreakable Watch Crystals, New York, N. Y.; Morris Klinger, Electro-Seal Watch Crystal Co., New York, N. Y.; Prosper Brozen, B. B. Crystal Corp., New York, N. Y.; Max Fargotstein, S. Fargotstein & Sons, Memphis, Tenn.; Otto Stern, Stern, Inc., Columbus, Ohio; Harold Perlman, American Perfit Crystal Co., New York, N. Y.

As a result of this panel, a committee was appointed to work toward a standardization of bezels. Jerald C. Newman of Federal Watch Crystals, New York, was appointed chairman.

Findings

Moderator: William R. Katz, Wm. R. Katz Company, Dallas, Texas.

Panel: Edgar E. Baker, W. R. Cobb Company, Providence, Rhode Island; Agnes M. Shaffer, Carl R. Shaffer & Company, Kansas City, Missouri; F. M. Bedinger, F. H. Noble & Company, Chicago, Illinois; William L. Little, Geo. A. Fuller Co., Pawtucket, Rhode Island.

The panel established that a basic standardized numbering system for findings was impractical at this time. Most finding manufacturers acknowledged that they also sell local jewelry manufacturers direct and that a concerted selling effort on the part of jobbers could possibly bring an end to such dual distribution.

'What Can Suppliers and Jobbers Do to Stimulate Business?'

Moderator: Julius Hurley, The Hurley Watch Company, New York, N. Y.

Suppliers: Ben Jadow, B. Jadow, Inc., New York, N. Y.; Harold J. Loevy, Zenith Mfg. & Chemical Corp., New York, N. Y.; Wilbur Cureton, The Newall Mfg. Company, Chicago, Illinois; Edward Renz, Hammel, Riglander & Company, New York, N. Y.; Philip Laks, M. J. Lampert & Sons, Inc., New York, N. Y.; Stetson M. Risdon, Waltham Watch Co., Waltham, Mass.

Jobbers: Edward L. Endman, Pacific Jewelers Supply Company, Los Angeles, California; William Kilb, Kilb-Beck Company, Milwaukee, Wisconsin; Eugene Swigart, The E & J Swigart Company, Cincinnati, Ohio; A. C. Carter, Ewing Bros., Atlanta, Georgia; Arnold Vicksman, Vicksman Jewelers, Denver, Colorado.

1) Suppliers and jobbers should have educational program for all salesmen.

2) Suppliers should take more pains to create attractive sample lines.

3) Most suppliers definitely will not consider longer dating because of "short margin of profit" and their unique operation problems.

4) Jobbers should give greater emphasis to display of lines.

Jewelry Repairing

By R. ALLEN HARDY

THERE HAVE been so many inquiries concerning stone setting lately that the subject may as well be covered now. It is generally taught at the end of jewelry courses but if the beginner has watchmaking experience this phase of jewelry repair may be entered into at any time.

It is entirely different in technique from anything yet covered in these articles and although I do not consider the procedures either difficult or complicated a great deal more self-assurance and confidence is demanded by this branch of jewelry work.

When setting a diamond for the first few times it is quite a hard thing to overcome the fear of ruining the setting job or spoiling the diamond in some way. However, it does not take many such jobs before the beginner is at ease with the work and begins to really enjoy it. A diamond well set is a thing of beauty, a work of art and a great satisfaction to the stonesetter.

Before beginning the procedures of stone setting it will be well to remember that the discussion will not be presented as though the reader is going to make stone-setting a career. Professional stone setters who sometimes work on a production basis have many techniques for achieving the same results that we will try to achieve. Their tools may be slightly different in some respects but are basically the same. The method taught here will be the simplest approach directed at the watchmaker-jeweler who also wishes to add stone setting to his accomplishments.

Setting a Stone in Tiffany Mounting

Begin: A beginner in stone setting should spend a lot of preliminary time making some tools and sharpening the various gravers needed to do a setting job. When all tools are in readiness and their uses understood it is quite possible to do an acceptable job on the first one attempted.

The necessary tools are:

Beading tool
Milgrain tool
Set of regular diamond-setting burrs
#42 flat tool
#52 round tool
Shad-belly graver
2 graver handles
3" length of round steel stock M M
3" length of square steel stock M M
Flexible shaft machine
Burnisher
Caliper gauge M M
Small barette file
Beeswax

This sounds like very little equipment but it is all a beginner will need. Later, he may purchase different size gravers to suit himself but nothing more is really essential to set a diamond properly.

First, mount the two pieces of steel stock in the graver handles, taking care that they are straight in the handles. These will be used as stone tighteners for Tiffany settings (also used for miscellaneous tightening-bezel tops and the like). File the square stock as shown in Figure 12. Do not polish the finished surfaces but rather leave them dull or gray — this helps prevent slipping.

File the round stock as shown in figure 12A. Also leave the finished surface dull.

Next—consider the gravers. The flat tool must be sharpened as shown in Figure 13. The finished surfaces must be highly polished with 4/0 emery. Be most careful not to round the edges when polishing.

Sharpen the No. 52 round tool as shown in Figure 13A. A brilliant polish is not necessary.

Sharpen the shad-belly graver as shown in Figure 14. This graver is rarely used, but when the occasion arises—no other tool will do. Polish the surface (the face of the graver).

We are now ready to set a stone in a Tiffany mounting (see Figure 15). If no

Mr. Hardy invites your questions pertaining to jewelry repairing. Questions should be directed to Mr. Hardy, c/o The American Horologist & Jeweler, Box 7127, Capitol Hill Station, Denver 6, Colorado. Please enclose a self-addressed, stamped envelope.

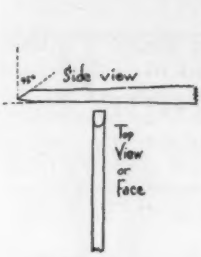

Fig. 13

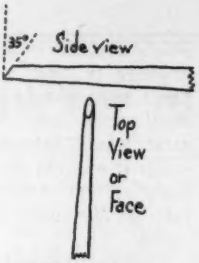

Fig. 13A.

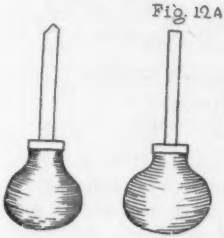

Fig. 12A

Fig. 12

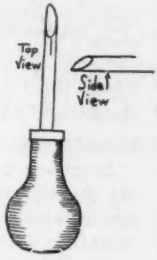

Fig. 14

Fig. 15

Fig. 16

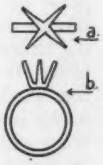

Fig. 17

Fig. 18

Fig. 19

Fig. 20

Fig. 21

Fig. 22

Fig. 23

mounting is available a substitute may be made out of flat brass stock measuring about 2mm. thick. Saw out a section in the shape shown in Figure 16. Solder this section on top of a brass band ring. (This band may be made out of the same brass stock—no need to finish it, simply solder it and round it up.) On the opposite side from the soldered joint in the band ring—solder the piece shown in Figure 16. This operation will soften the brass stock and the four prongs may be bent upward and shaped similarly to a Tiffany mounting; see Figure 17. A Tiffany mounting has six prongs but the same practice may be had with four. Using an imitation stone (fairly large) shape the four prongs equi-distant from each other. (The stone being perfectly round will cover a certain amount of each prong equally—if the shaping is accurate.) See Figure 18. File the top of each prong perfectly flat before placing the stone in position. The stone should touch each prong and should cover the same amount of metal on each prong, when observed looking directly down to the crown of the stone.

Measure the girdle of the stone with the caliper gauge. Select a burr very slightly smaller in diameter. (When in use the burr always makes a seat slightly larger than its diameter.) Place the burr in the flexible shaft chuck and sink it in the mounting to a depth as shown in Figure 19. The actual depth will depend on the height of the crown of the stone and on the amount of metal needed to hold the stone securely.

Try the stone in the seat using a tapered piece of beeswax to handle the stone. Be sure the stone rests equally on all four prongs.

With a jewelers small barrette file shape the prong tips as shown in Figure 20. With a pair of snipe-nose (smooth jaw pliers) make a slight bend in each prong (Figure 21). Place the stone in the seat of the mounting and prepare to push or bend the tips over the edge of the stone. Always bend one tip, then the opposite. Continue this slight bending until the stone is held securely. Check constantly to see that the stone is still level after each bend.

When each prong is firmly against the stone (Figure 22) all that remains is to shape the tips and polish. See Figure 23

for the finished appearance. The barrette file (small with smooth sides) is used to point the prong tips. The entire top of the mounting may then be polished.

Polishing a Tiffany mounting may be carefully done using medium-bristle wheel brushes, always presenting the work to the brush in such a manner that there is little danger of "snagging" a prong and bending it away from the stone. The usual "tripoli first—rouge second" method holds good in polishing mountings. To complete the brilliant polish a very light touch to a soft buff will do the job.

For practice work it is a good idea to begin with a fairly large stone, about the equivalent of a carat diamond, gradually reducing the size to a ¼-carat stone.

After completing this work the beginner is well equipped to tighten stones set in this style mounting, as well as set real diamonds or miscellaneous semi-precious stones.

It is well to remember that the diamond will stand more pressure or abuse than any of the softer stones. This is a warning to treat the softer stones with great care as too much pressure or a slip may chip the edge and spoil the stone. For example, I well remember having set a Titania successfully (I thought) only to have the customer come back in two weeks with a chipped edge just under a prong that apparently was too tight.

The next step in stone setting will be the popular fish-tail style of setting of which there are many variations.

Dear Mr. Hardy:

I have been reading your articles in the American Horologist & Jeweler with great interest and have a query of my own on which I would appreciate a reply. I am a mere amateur in the field, however, I have noticed many others have the same difficulty. Frequently I come across rings and watch cases with filigree work which has a yellowish (straw colored) tinge in and about the soldering and I would like to know if white gold can be soldered without this, or does one always have to resort to rhodium plating to overcome it.

On large surfaces I do cover most of the article with boric acid diluted in alcohol, however, in small work like soldering the heads onto shanks of rings and lugs on small watch cases this is an impossibility, as it would interfere with the flow of solder if brought close to the joints. If you know of some other method more successful than the above, it surely will be appreciated.

I believe it would be a good idea to add a Question and Answer department to your regular column, so why not get the consensus of opinion of your readers on this matter?

MICHAEL A. FIORILLO
323-D West 9th Avenue
Amarillo, Texas

Dear Mr. Fiorillo:

In answer to your first question concerning the yellowish tinge around the joints where white gold has been soldered, I would say that white gold can be soldered without leaving a distinctive yellowish color. For instance, if you are soldering a 14k white gold ring and are using a good grade of 14k white gold solder, the joint should not be detectable if correct soldering techniques are observed. By this I mean joints should be flush before soldering so that a minimum of solder is necessary. The solder may not always match perfectly the white gold ring being worked with, but a skillfully executed job will certainly minimize the slight difference.

As to the filigree rings and watch cases you mention, this suggests possibly some very old jewelry that was made at a time when jewelry manufacture and techniques were not up to the present improved standards. I would suggest that you handle this type of work with great care, as some of the old-type filigree rings have been known to perform some very strange tricks while being soldered. Besides being generally brittle, the shanks have been known to fall apart at the slightest application of heat, leaving the jeweler with a complete new shank job on his hands free of charge.

In answer to your last question, I do not believe you should concern yourself too much with trying to prevent small articles from becoming discolored during soldering. Every solder joint usually demands a certain amount of buffing and polishing and this normal procedure usually removes

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any nearby discoloration automatically. At any rate, the pickle bath after soldering will certainly remove any undue amount of oxidization or stain.

R. A. HARDY

Dear Mr. Hardy:

I have been following your series of articles in the A. H. & J. with a great deal of interest and pleasure. I know that they will prove popular as they fill a definite need. I am a watch repairman by trade and a jewelry repairman by necessity. I am called upon several times a week to size or repair rings and have been successful with a few exceptions. I have had some difficulty with white gold. All goes well until I polish the joint, then enough solder seems to polish out to let the joint show. To polish I use a soft felt buff (combination style) with tripoli and follow with red rouge on the same type of buff. I don't feel that I overdo it with the tripoli, I just use it enough to remove scratches left from fine emery paper. Will appreciate any advice you can give me on the above.

I am also having the same difficulty with platinum with the added exasperation of having an occasional joint break. I am using an electric soldering machine, Eurema flux and solder that the boss buys from Hoover and Strong. I always try to file a nice close joint and use enough heat to heat the joint red and melt the solder. The flux could be at fault here.

Will appreciate an answer on the above at your earliest convenience.

JAMES E. RUMBOUGH
Viewmont Apts. 11-C
Hickory, North Carolina

Dear Mr. Rumbough:

Your very kind remarks concerning my articles are appreciated and I hope they will continue to be helpful to you.

Your difficulty with white gold is a common one. Suggest you try this method: First, be absolutely sure that your joint is flush before soldering. Hold it up to a window or bright light and if you see a crack of daylight showing through the joint, it is not flush. Second, after soldering the joint, use emery board or emery paper to smooth it. The final emery paper or board used should be a worn-out piece of No. 4/0. After using a fresh piece of 4/0 then the much used or worn-out piece will begin to bring out a polish on the ring shank that needs only to be touched to the rouge buff for final work. (Note—no tripoli).

For platinum work try not using solder, but instead use a small piece of platinum that is pounded out paper-thin on a bench block. Insert this piece of thin platinum in the joint. Using dark glasses, of course, follow the same procedure as though you were using solder.

When the correct melting point is reached, you will see the thin piece of platinum merge with the shank and the result

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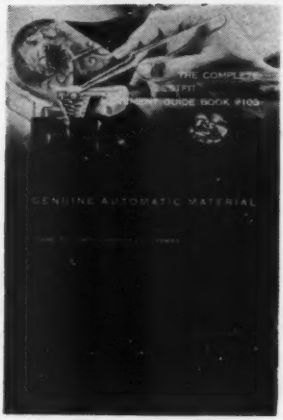


AMERICAN HOROLOGIST & JEWELER BOOK DEPT.
P. O. Box 7127 **Capitol Hill Station** **Denver, Colorado**

is a welded joint that cannot be detected by anyone, especially if you were to use a piece of platinum from the same ring to make the joint.

R. A. HARDY

Dear Mr. Hardy:

I would appreciate your recommendations on an economical outfit for hard soldering by the hobbyist. I would like to have an oxo-acetylene outfit, but for the first cost plus the bottle deposits and rentals make it somewhat impractical.

Are any of the torches that use the throw away tanks (i.e. Prepo) suitable for hard soldering? I am in an isolated community and do not have city or natural gas, but propane bottles are available.

J. F. PLEXICO

Box 142
Dahlgren, Virginia

Dear Mr. Plexico:

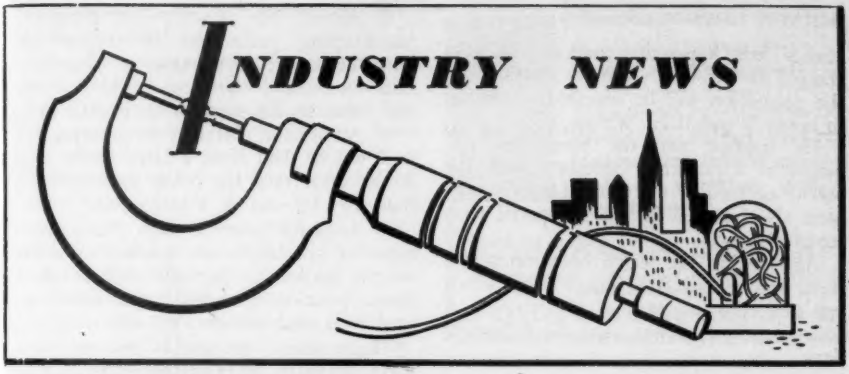
There are torches available that use throw away tanks, but to determine the practicability of purchasing one of these, it would be necessary to know precisely what sort of soldering you are going to do. I have seen only a few such torches and although the idea is attractive, (as well as the compact unit) the limitations are many —on the ones I have seen.

Perhaps you do not know that you can purchase an outfit that uses acetylene gas without oxygen. This outfit is very inexpensive and comes with several different size nozzles to handle all types of soldering.

Both the throw-away tank type and the acetylene outfit can be found listed in the catalogs from the various supply houses. My suggestion is to purchase one that does not limit you.

R. A. HARDY

"See what I mean, sir, this is a real expansion watchband!"



N. Y. HOROLOGICAL SOCIETY WINDS UP SEASON'S MEETINGS

By Associate Editor "Barny"

The evening was the last of Flag Day, the weather hot and humid. Nevertheless, some 135 horologists and their wives came to participate in this meeting held night-club style. Sitting around at the many tables were world-renowned members of the trade. All the ladies received souvenirs of perfume.

After the shortest business meeting I have ever heard, President Henry B. Fried gave a rather flowery introduction of some of the notables present. Chief amongst those to whom this presentation was delivered was Orville R. Hagans, who came all the way from Denver to attend this meeting. This fellow Hagans, sure gets around, and seems more interested than ever in the welfare of the horologists at large.

The dean of watchmakers, Dr. Arthur Rawlings, received his share of the presentations, as well as your associate editor. The introductions were followed by entertainment presented by the family Schwende —four girls and four men gave with pleasant music to the ear.

Door prizes were next. A fine box of tableware, a wristwatch and a book by Henry Fried—his latest. I got hold of this book during the course of the evening and if you were to ask me the title, well, I just wouldn't know because I became so interested in the contents. It is well illustrated with down-to-earth text that even I can understand.

Two fine films were shown in color, one by General Time of the fabulous Wheeler collection, and a Rolex film of time in the finest photography I have ever had the pleasure to see. While Felix Klein, who is a handwriting expert hobby-wise, spoke on the subject next to his heart, the members and visitors were served with ice cream, cake and coffee.

Meetings adjourned until Fall.

WATCH CHECK-UP CLINIC DRAWS 500 CUSTOMERS

A unique three-day watch check-up clinic recently held by Hess Brothers, Allentown, Pa. brought in more than 500 customers interested in having their watches checked for accuracy, it was announced by Max Hess, Jr., president of the store.

The store, whose five full time watchmakers probably break the record for the number of watch repair men under one store roof, charged 50 cents for the watch check-up.

Handled in the department store's modernized fine watch and diamond department, the 50-cent offer included an inspection, checking and adjusting on a timing machine, cleaning, polishing and cementing, if necessary, of the face, crystal and case. Also included was replacement of spring pins on wristwatch straps.

Of the 500 persons who consulted Hess's watch experts, nearly 25 per cent left their timepieces for major repairs. In addition, there was good response on sales of straps, crystals, stems, etc.

The promotion was an experiment developed at the nationally known store along the lines of the familiar "electric shaver

clinics" and "typewriter tune-ups." Results showed an excellent customer reaction and the promotion will be repeated, according to buyer Wendell H. Wilson, Jr.

He stressed that the promotion was aimed at acquainting customers with the service offered by the store. Trade-in sales were also featured during the special service offer.

Announcing the watch check-up was a three column ad five inches deep which was part of a full page of advertising. A follow-up box ad was used the following days.

'WATCHMAKER-JEWELER' TEAM ANSWERS JEWELERS' PROBLEMS

Development of the watchmaker-jeweler team and emphasis on service by the jewelry store is the retailer's answer to the problem of meeting the current trends of the market place, Paul Tschudin, director of the Watchmakers of Switzerland Information Center, declared at a talk recently in Washington, D. C.

"You watchmakers," he pointed out, "are the specialists, and you and the service you render can bring the business that is rightfully the jewelers' back to their door. The watch repair department is your responsibility, but actually the work you do in many cases is the basis for as much as one-half the entire jewelry store business. If you will keep this in mind you will understand your importance to the watchmaker-jeweler team."

In his talk, Mr. Tschudin offered a number of suggestions concerning ways that the watchmaker can contribute to this "team." They included:

1. Do the best possible job in explaining, selling, and merchandising repair.

2. Take the necessary time to explain to the customer what must be done to put his watch in the best operating condition.

3. Take full advantage of the fact that you use only original, factory-approved genuine replacement parts by emphasizing it to your customers and your community.

4. Use store window displays to promote your service and repair operation.

5. Advise the jeweler in the choice of merchandise he should carry and sell (from a quality and technical viewpoint.)

6. Advise the jeweler on equitable bookkeeping procedures in conjunction with the service department, so as to help him understand the department's financial value to the store as an overall unit.

7. Advise the customer in choosing his new watch. And if in a large store, help advise and train the other personnel on how they too can do a better job.

8. Acquaint yourself with the various types of special-feature watches available on the market so that you will be in a better position to adapt your sales approach to your customer's needs.

"Remember," he said, "one of your main stocks in trade is confidence. You must have your employer's confidence and the confidence of the public. Be careful that you make proper estimates and also that you quote correct prices. In this manner the confidence of both your employer and the customer will be maintained. And while on the subject of confidence, make certain that your department offers a sensible repair guarantee. And by this, I mean one that is both fair to your store and to the public."

Mr. Tschudin also devoted a portion of his talk to a description of the Swiss jeweled-lever watch industry and the way it is made up of independent firms competing with each other. "Although they work together to maintain the quality of the jeweled-lever products that they export to other countries, they are completely free in the conduct of their business," he pointed out.

"This group of Swiss manufacturers is the group you know as The Watchmakers of Switzerland, and they are most happy to help you maintain your high level of workmanship."

SILBERT IMPORTS ISOVAL HAIRSPRINGS FOR VIBRATING

M. J. Silbert & Company of Elgin, Illinois recently concluded an importing arrangement for Isoval hairsprings to be used in their hairspring vibrating department. The decision to use the Isoval hairspring was based on tests made by Silbert of various springs of high quality Swiss manufacture.

M. J. Silbert points out that differences exist between the Isoval and other springs, and that the reasons for these

differences lie in the history of hairspring developments.

He states that with the introduction of wrist watches in this country, a major problem confronting watch repairers was the need for replacement springs. Since all hairsprings at that time were manufactured of steel, gradual methods of importation were devised.

He states further that with the advent of the mono-metallic balance wheel, the Swiss fulfilled the new need for a self-compensating hairspring to act in conjunction with the new balances. The field was opened for the production of alloys which could be made to work with the new mono-metallic balances. To correct the gauging faults of most spring manufacturers, the Swiss introduced a standard gauge for all hairsprings.

The first springs made for the new balances, Silbert continues, were white in color, and some were rust-proof and non-magnetic. Later, however, springs came out in this color which failed to carry the same properties. Eventually, the field of spring manufacturers was narrowed down to those spring manufacturers whose product was acceptable to watch manufacturers. Isoval was one of these.

The Isoval hairspring, while blue in color, is guaranteed to be non-magnetic and rust-proof, and is said to equal the qualities of the original spring when used in replacing hairsprings of high grade watches. It is also said to surpass the spring from all other watches not classified as high grade. The spring has five qualities, and in the pricing, the difference between the first and last grades will differ by 400%.

The Silbert firm states that there is no advance in its price for flat or breguet hairsprings, despite the fact that a high grade Isoval spring is being used on all Silbert hairspring jobs.

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thetic substance made by a still-secret process, is expected to eliminate one of the greatest single obstacles to successful arctic military operations, and may have other applications as yet unexplored.

George G. Ensign, the company's director of research, said it should have wide use both for timepieces and other precision military equipment such as cameras, gun sights, fuzes, meteorological and navigational instruments, etc.

Ensign said the oil is a direct result of developmental work the company has been doing on watch lubricants since 1938, and that all test data are being offered to the armed services for further study. He added that Elgin presently has no commercial use for the oil, which initially will be "considerably more expensive" than the $1000-per-gallon cost of its present standard watch lubricant.

Claimed to be the most efficient cold-weather liquid lubricant ever developed, the new oil has operated jeweled watches at temperatures down to 115 degrees below zero.

'SALES AND SERVICES RISE,' SAYS STATISTICAL CHIEF

The amount of disposable income — money "left over" after income taxes — is a major factor in the number of watches sold and the volume of watch repair business, according to Louis J. Paradiso, assistant director, Chief Statistician of the Office of Business Economics of the U. S. Department of Commerce.

Speaking before the 8th annual meeting of the Watch Material Distributors Association of America at the LaSalle Hotel in Chicago last month, Paradiso further stated that "sales of watches and repairs of watches in past periods have been quite sensitive to changes in disposable personal income, with watch sales being somewhat more responsive than the repair business."

As a result of the personal income tax reductions which went into effect at the beginning of this year, he said that the flow of disposable personal income has been maintained so far in 1954 at the peak rate of last year, and nearly $4.5 billion above the year ago annual rate.

According to Paradiso, consumer expenditures for repairs of watches, clocks, and jewelry have risen in the past four years about 20% compared to a rise of 33 and one-third per cent in the disposable income.

NEW BELT-ON WATCH STRAP NOW AVAILABLE ON MARKET

The first watch attachment made expressly for wearing on a belt was recently announced by the Belt-On Watch Strap Co., 150 W. 34th St., New York City.

The company states that the new attachments combine many safety features, and is ideal for ladies and men who constantly use their hands, especially for those who take part in athletics and strenuous activities.

The strap is made of genuine leather in assorted colors, and also genuine alligator and lizard. They are available at material houses and jobbers, or through the Belt-On Watch Strap Co.

HOROLOVAR CO. ISSUES NEW 400-DAY CLOCK REPAIR GUIDE

Charles Terwilliger of the Horolovar Company, Box 299, Bronxville 8, New York, has released his newest book "Horolovar 400-day Clock Repair Guide." Section II of the Horolovar 400-day Clock Repair Guide is devoted to twenty-one frequently asked questions about 400-day clock repair. Other sections of the Horolovar Repair Guide will include: I—Adjustment and Repair of the 400-day Clock Escapement, written and illustrated by Henry B. Fried. III—Identification of Dial Names and Trade Marks. IV—Illustrations of 168 400-day Clock back plates together with the correct strength Horolovar suspension spring. V— Illustrations of 32 identified suspension spring units (for all clocks imported since 1949) showing correct position of blocks and fork on the suspension spring. VI—About The Horolovar Company. VII—Horolovar 400-day Clock Parts and Tools.

The book is available through the Book Department of the A. H. & J. $3.00 plus 5c postage.

Chemical Versus Mechanical Systems of Rust Control in Watches, Chronographs, and Other Enclosed Precision Instruments

By Troop-Balas Laboratories
Philadelphia, Penna.

EVER SINCE man's incorporation of the ferrous metals into his way of life he has been fighting a constant and oftimes losing battle with his enemy—Rust.

This has been especially true in the horological industry and small precision instrument fields, where the presence of rust is always troublesome, due to the close tolerances involved and the fact that the slightest increase in friction in the train or elsewhere—due to rust—is always sufficient to affect the motion and the eventual timekeeping of the movement.

With the gain in popularity of the more complicated timing units — the chronograph and the chronometer — the problem increased manyfold; this due to the vast number of added steel parts, all subject to rust and corrosion.

Metallurgical improvements, and the change to the stainless or non-rusting metals in the past has been rather spotty since they have not shown themselves capable of withstanding the great forces expended on such small surface areas as we find in the horological field.

Mechanical improvements such as the waterproof case, the heat-sealed crystal, the watertight crown, the flexible gasket have all been extremely helpful and deserve much credit for their assist to modern precision timing. However, none of these either singly or in combination have provided the full rust and corrosion protection so necessary to the trade. Two simple experiments, one conducted by a leading American watch factory, the other at laboratories in Philadelphia, attested to this fact.

A brief resume of the factory experiment was that an empty waterproof watch case with watertight crown was placed on a moist blotter, and both were placed on a hot plate set to 98 degrees F. to simulate the wearing of the case on a perspiring human wrist.

In a few minutes the haze of moisture condensing appeared on the inside of the watch crystal. Since the watch case was closed in an atmospherically - controlled room, we can assume as did the factory, that the moisture came from the outside of the case by way of the screw threads and around the gasket condensing on the inside of the crystal. The action was purely a capillary one, the same phenomenon that will suck the moisture from the roots up the trunk and to the leaves of a 75-foot high tree.

Prior to this, in 1942 to be exact, we had been conducting tests at the laboratories in Philadelphia, where not only a waterproof case, crown and fused crystal were used, but a grease barrier was also placed on the threads of the case as well as on the gasket and crown gasket. The watchcase was then positioned in the center of a 10-inch high and 12-inch in diameter glass tube upen at both ends. Ordinary air taken in from the outside of the building was cycled through at the rate of 110 cubic feet per minute. At the same time the pressure in the tube was raised and lowered once every hour to simulate the variances in climatic pressures due to weather and the change in pressure resulting from going to the upper floors of a house or building, or simply going up and down in an elevator.

Within 14 hours we found, as in the factory experiment, that moisture droplets had formed on the inside of the crystal. We also found that by suddenly passing air just a few degrees cooler around the case in the tube, we could induce a much greater amount of condensation on the inside of the watch crystal. This would be similar to someone wearing a watch going out into cooler weather or jumping into water with a watch.

We also found, strange to say, that if an ordinary snap-back case as well as a water-

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proof were set side-by-side in the tube, moisture droplets would often appear in the crystal of the waterproof case before appearing in the crystal of the snap-back case. However, a sudden drop in temperature would induce almost equal amounts of condensation. The explanation here would seem to be that the snap-back case seemed to breath the normal moisture-laden air in and out while the moisture in the air that entered the waterproof case might tend to remain trapped, waiting for the sudden temperature drop which would cause it to condense and start the rusting process if a movement were inside the case.

Realizing at the time that metallurgical, or mechanical improvements in the watch case, or even the use of a new type dessicant we had developed, was not the answer to overcoming rust and corrosion, we here at the Troop-Balas Laboratories turned the problem over to our research staff headed by Dr. Paul Beckman, in December of 1940.

By March of 1941 Dr. Beckman was able to give us a combination of chemical compounds we named "NeveRust," which seemed to be the answer both to overcoming rust and corrosion in the movement, as well as the problem of protecting the craftsmen's materials and tools during storage and use.

Due to shortages and other factors during the war years, no further work was done on the project until the end of 1947, when the various chemical combinations were made available to a restricted group for the purpose of determining which compound was best; what flaws would show up while in actual usage, and for simple market testing.

The test group chosen was a representative one, covering all parts of the country, and included jewelry stores sending their repair work out, jewelry stores having their own repair departments, watchmakers, trade watch repair shops, and last but not least, that group doing repair work as a hobby or sideline in their spare time.

This first test period was ended in January 1949, when plans for another market test were made. At this time a new patented feature was included. This was the Tag System now used, which brings the customer back year after year as the date on the tag specifies.

During this 17-months period "Neve-Rust" showed itself to be a great customer developer and customer-bringer-back, plus a boon to the watchmaker getting comebacks during his guarantee period because of complications caused by rust and corrosion.

● ● ●

At the request of those who have asked for a simple non-technical explanation of "NeveRust"; how it works, what it does and what we have discovered since placing so revolutionary a system of "Chemical Rust Control" before the trade, a brief resume follows:

"NeveRust" is the Troop-Balas & Co. registered name for a patented combination of chemicals. These chemicals vaporize slowly, changing into a gas which has the ability, when placed into a watch case, to inhibit and stop rusting by tying up the oxygen that is in the air in the watch

case, or the oxygen present in the moisture that is in the air in the watch case; in such a manner that the oxygen can no longer join with the ferrous metals of the watch movement and cause rust and corrosion. Since "NeveRust" is absolutely neutral and inert, affecting oxygen only, it will not mix with nor affect any part of the movement, nor for that matter, any metal or material used in the horological field as a whole.

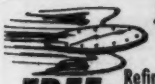
While "NeveRust" is available in the powder form for various industrial needs, we have, for the horological and enclosed precision instrument field, united the chemicals with a thin neutral paper backing. These various-size wafers are impregnated to varying chemical concentrations, each wafer size engineered to protect from rust and corrosion watch movements of specific sizes and shapes.

To simplify the eventual use of the "NeveRust" wafers a standardization of 48 different sizes and shapes in kit form was devised. A chart was then developed so that any size or shape movement could easily be protected by the simple means of holding the watch movement against the chart and using the proper numbered "NeveRust" wafer found in the corresponding numbered compartment of the "NeveRust" Kit.

It was also decided to engineer the chemical coating on each of the 48 sizes to give a rust-protective period of one year from the time the individual wafer's protective envelope was opened.

This time limit was arranged to coincide with the average watchmaker's one-year guarantee period, and has proven itself to be a wise choice both from the customer's and jeweler's viewpoints, since it eliminates comebacks due to rust or the side effects of oxygen, while the reminder tag which comes with each "NeveRust" wafer and is attached to each treated watch, acts as a reminder to the customer when to return for the re-rustproofing treatment.

Even though "NeveRust" was placed before the trade in its present form after a preliminary two-year market test, and even though constant checking showed there would be immediate consumer acceptance, we were quite unprepared for both the



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sudden demand for "NeveRust" or the wild claims under which a few jewelers were selling "NeveRust" to their customers.

It was shown by actual demonstrations, that a watch movement with a wafer in the case was protected against rusting, even in an extreme case where water entered the watch case. However, the movement would need cleaning and oiling as well as a new wafer for future protection. It was also obvious that there could be no rust protection once the chemicals had been washed out of the watch case, or once salt water had entered the case and left a deposit so that the "NeveRust" vapor could not do its job.

Both these periods, though unforeseen, were fortunately of short duration. To date with well over 1,000,000 watches protected by means of wafers, "NeveRust" has proven its rightful position alongside the bench of every watchmaker interested in eliminating rust and its effects, as well as to the jeweler interested in an instrument around which to build a good will customer development program.

Approximately a year after "NeveRust" was introduced to the trade our attention was directed to two interesting observations noted by one of "NeveRust's" earliest users and admirers — Elmer Zeidman & Sons of Philadelphia.

The first was, that new watches containing "NeveRust" wafers seemed to have longer shelf life without oil gumming or hardening prematurely, and did not need the usual cleaning and oiling before sales if kept in stock for too long a period of time. This also seemed to apply to repaired watches, where comebacks due to oil failures within the one-year guarantee period for some reason seemed to have disappeared almost completely. Since the same oil was being used as heretofore, with the addition of "NeveRust" as the only change in procedure, we were very much interested.

The second was that where, previously, comebacks due to mainspring breakage during the watchmaker's guarantee period, at certain times of the year, was a big problem, the inclusion of a "NeveRust"

wafer seemed to minimize this considerably.

This information was brought to the attention of Dr. Beckman who after conducting the necessary laboratory and field work, attested to the fact that although not originally planned, both claims were valid.

The basis briefly seemed to be that since the "NeveRust" affects the oxygen that is in or will enter the watch case to make it inactive, there is less oxidation of the oil and consequently less breaking down of the oils during the shelf life of the watch or during storage. Also, because of "NeveRust's" anti-oxidation effect, even mainsprings which have been weakened by microscopic rust in the pores of the metal, will not reach their full breaking point as readily as would unprotected movements where free oxygen would help continue the rusting process until the breaking point was reached.

Today—in addition to the now famous "NeveRust" wafers, a new type of "NeveRust" Kit composed of full sheets and small vial and box-size wafers, is being made available to the trade. This will help the jobber, watchmaker and instrument repairer to eliminate the rust problems found during the storage of materials and parts, in vials, boxes, trays and cabinets; as well as overcome the rusting of tools and instruments during non-use.

Although the chemical concentrations of the "NeveRust" in sheet form vary from those on wafers prepared for watch rust-proofing, they will assure from one year on up of rust-free protection, depending upon the amount of "NeveRust" rust-proofing paper used.

While other chemicals have been known in the past to keep iron and steel from rusting when in close proximity with them, "NeveRust" is entirely unique in the fact that it produces no adverse side effects on other metals or materials. It thus takes its place as the logical answer to rust problems in the horological field.

Experiments for rust and corrosion protection along purely chemical lines are still continuing. As they reach full maturity they will automatically be incorporated with present systems so that the industry may always turn to "NeveRust" as its answer to a troublesome and expensive problem.

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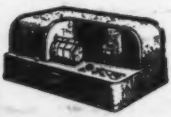

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